NEW FBI CIO DARWIN JOHN: THE UNLIKELIEST G-MAN Page 66

Darwin John

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Delta Plays Catch-Up The Price Tag Is Almost $1.5 Billion...So Far

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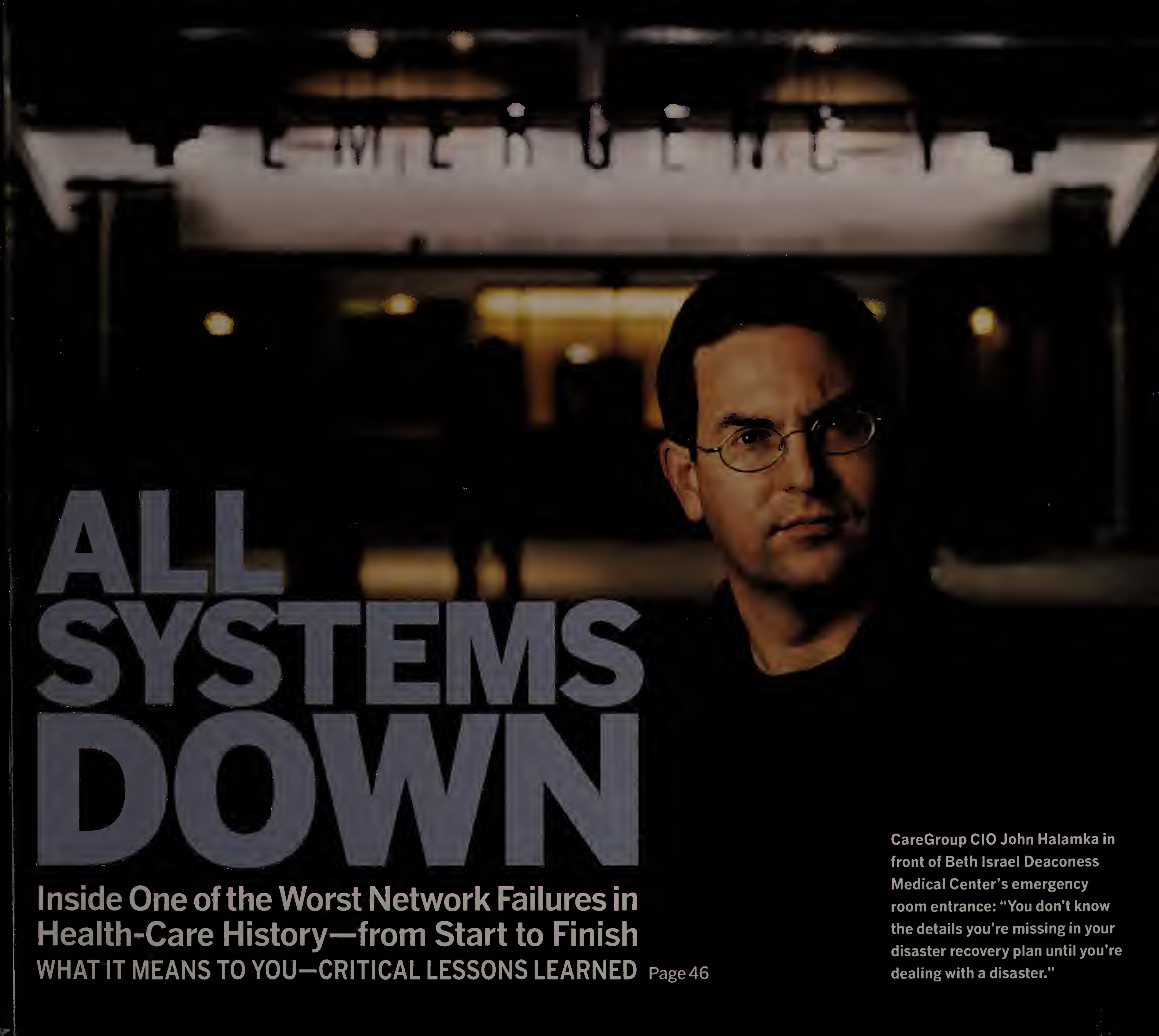

ALL SYSTEMS DOWN

Inside One of the Worst Network Failures in Health-Care History—from Start to Finish

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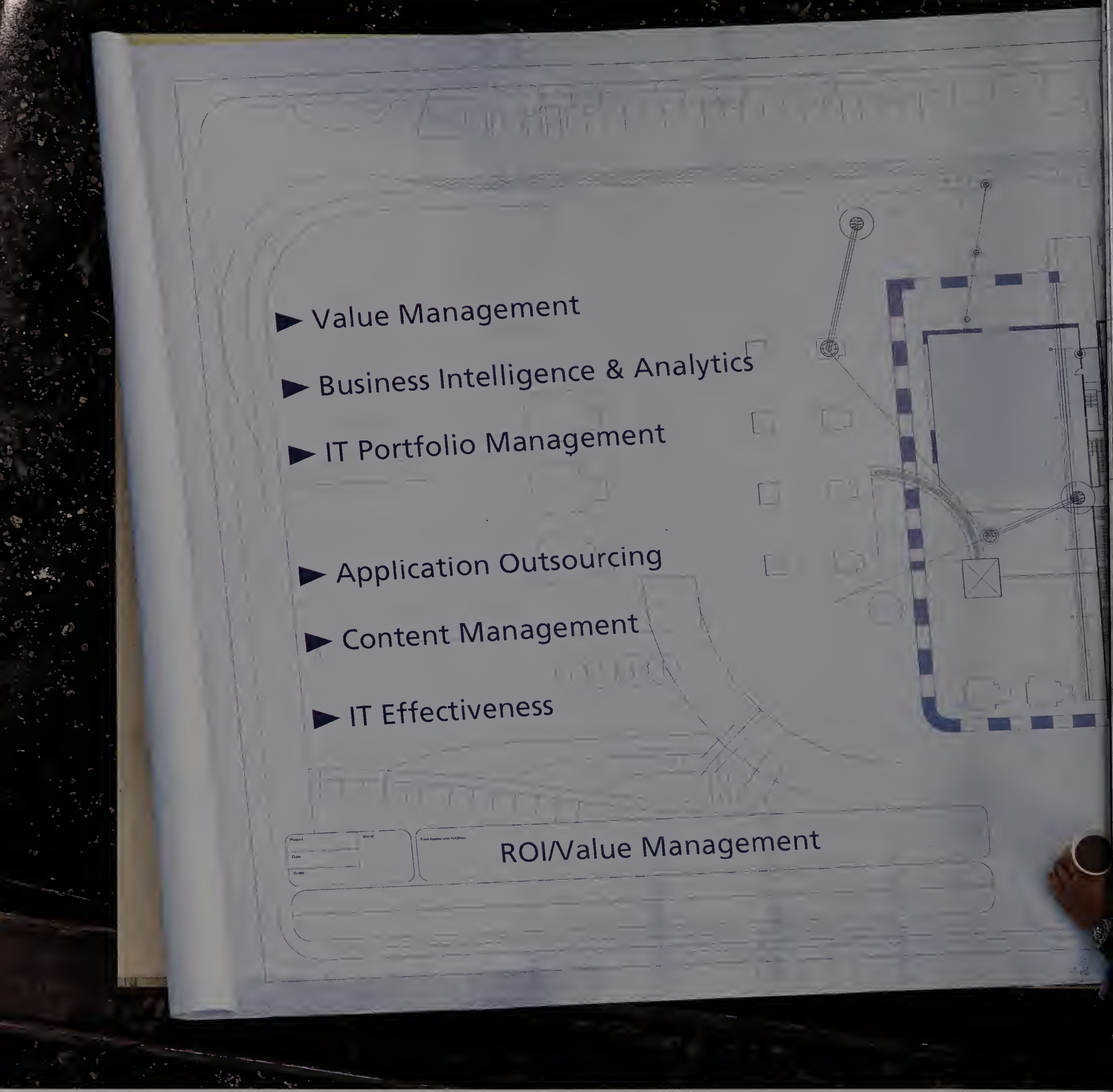
CareGroup CIO John Halamka in front of Beth Israel Deaconess Medical Center's emergency room entrance: "You don't know the details you're missing in your disaster recovery plan until you're dealing with a disaster."



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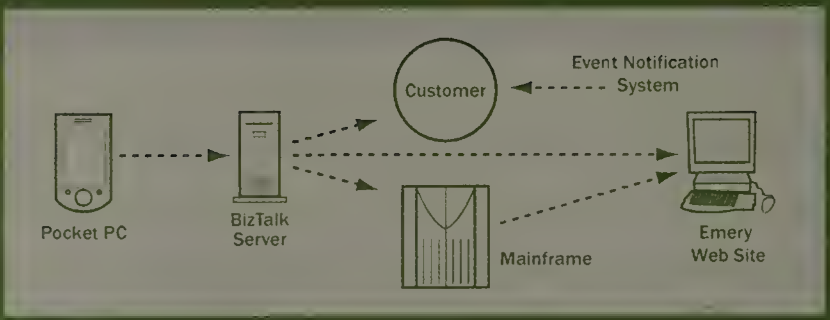

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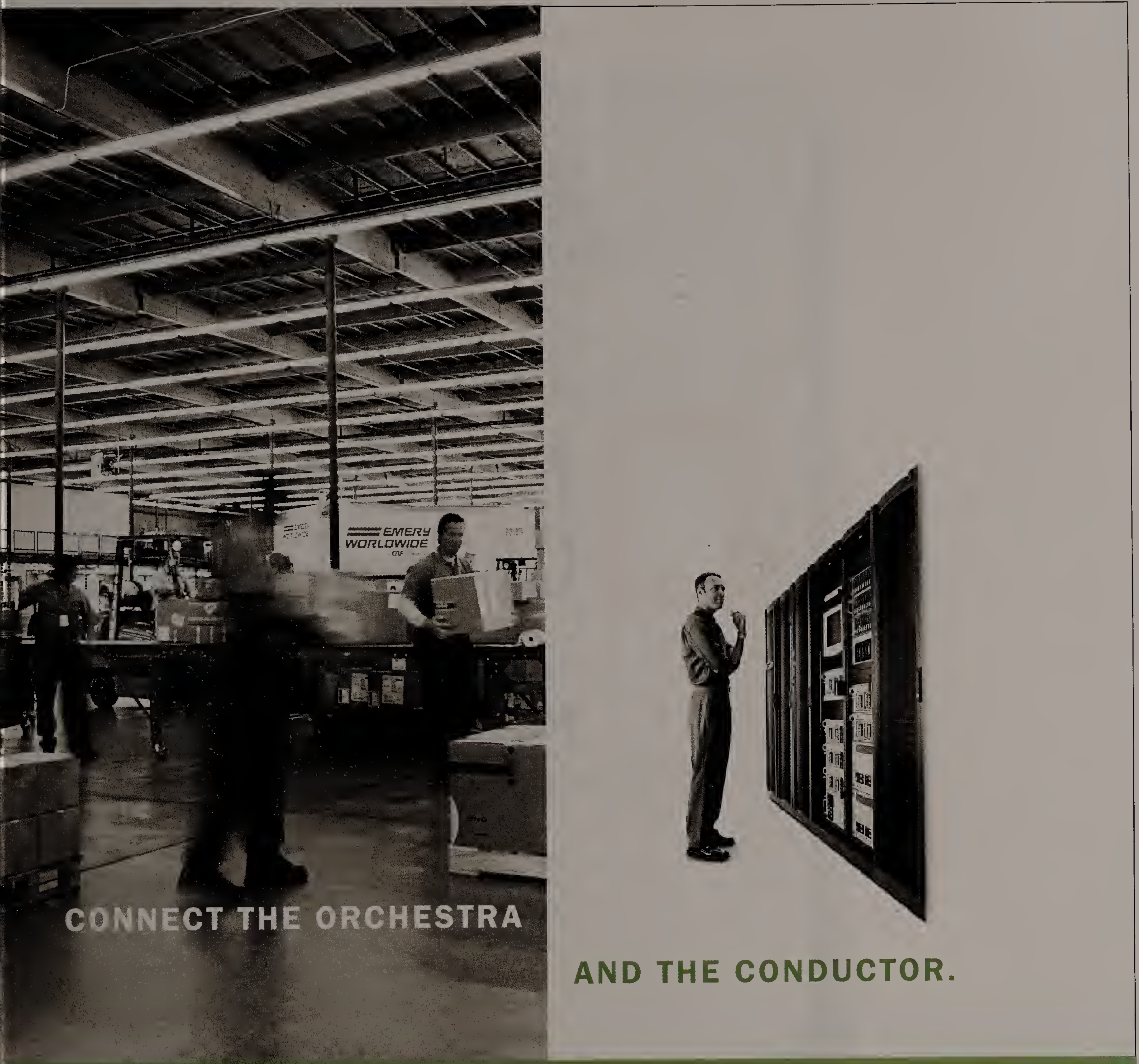

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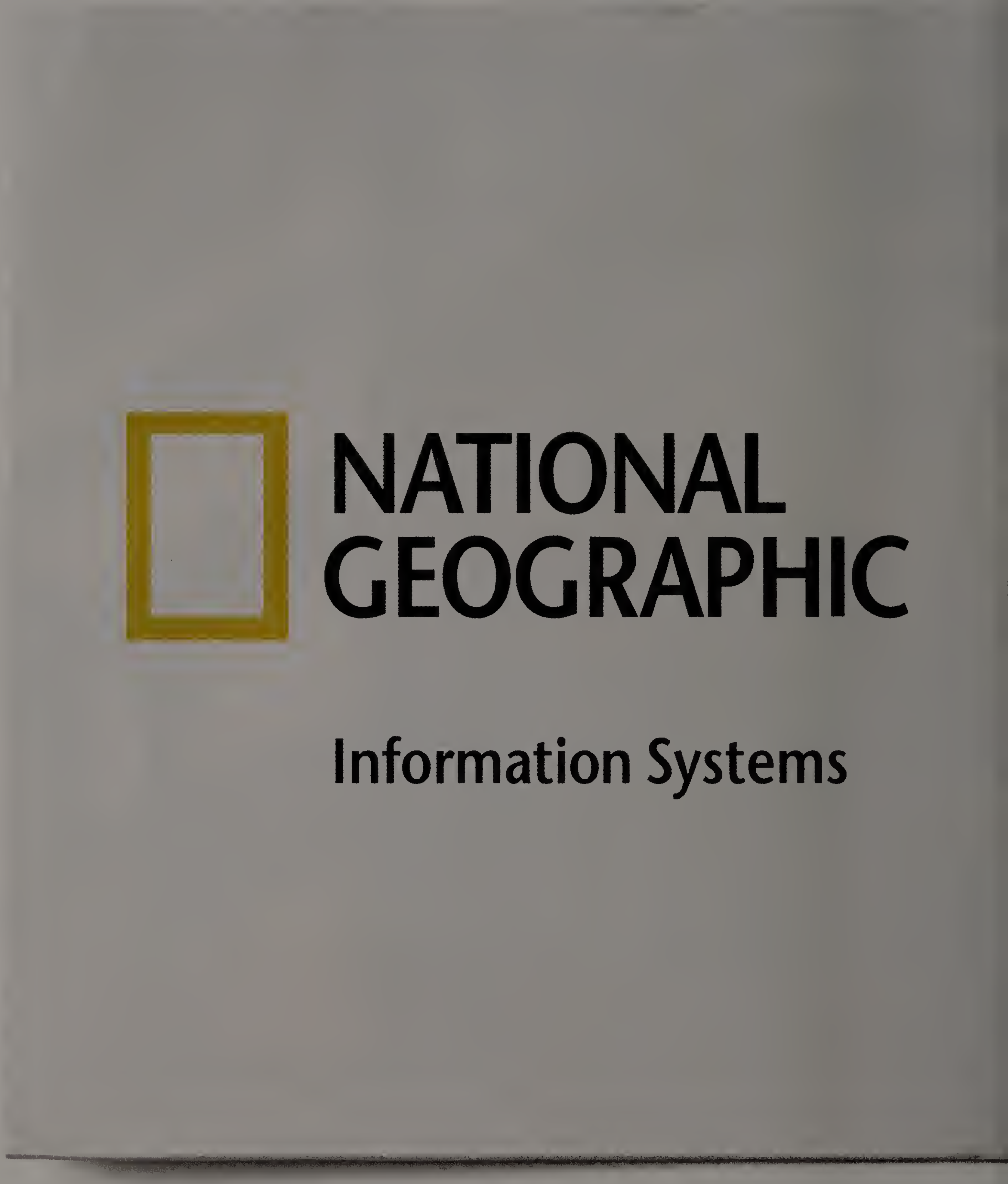

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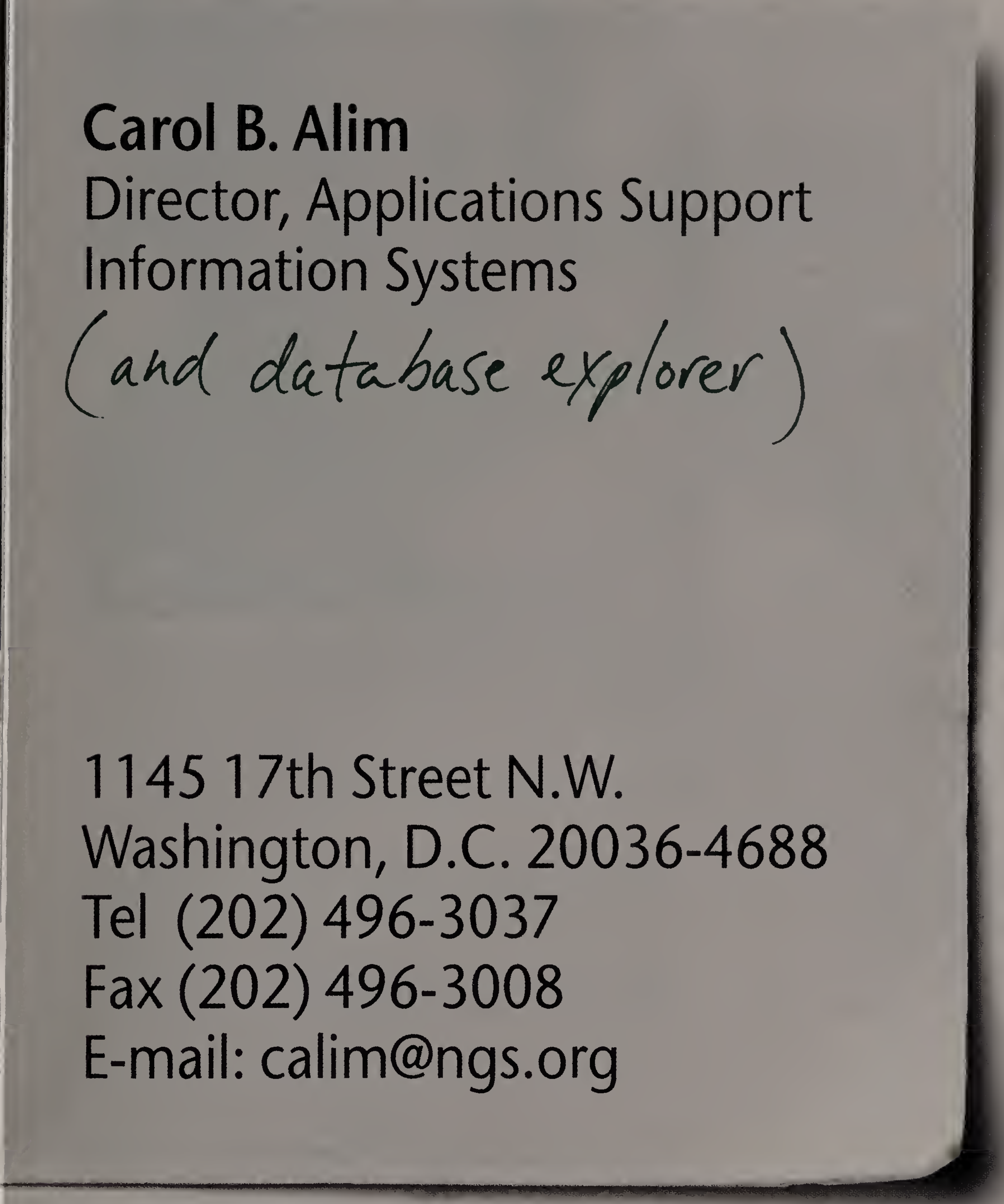

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CIO

VOL. 16 • NO. 9 • FEBRUARY 15, 2003

Cover Story

NETWORK MANAGEMENT | 46

ALL SYSTEMS DOWN

A blow-by-blow record of one of the worst health-care IT crises in history and what CareGroup CIO John Halamka learned from it. *By Scott Berinato*

COVER PHOTO BY JOHN SOARES

"I made a mistake," says CareGroup CIO John Halamka. "And the way I can fix that is to tell everybody what happened so they can avoid this." And he does.

Features

ENTERPRISE APPLICATION INTEGRATION

This Could Be the Start of Something Small | 54

Cheaper and faster has become the motto of almost every CIO, and that's why the reign of vast enterprisewide application suites is drawing to a close. Taking their place are targeted point applications. Here's how CIOs are making the switch.
By Stephanie Overby

"It's clear that my style is not the predominant style at the bureau," says the FBI's new CIO, **Darwin John**. "Being here a few weeks, I feel enormous pressure to fold into doing things the way the bureau does things. My choice is not to do that."

PROFILE | DARWIN JOHN

The Unlikeliest G-Man | 66

Can Darwin John, a mild-mannered, compulsively conceptual CIO, survive in the FBI's macho culture long enough to transform the bureau from a technological Keystone cop shop to an IT-powered collection of supersleuths? Don't bet against him.
By Sarah D. Scalet

INFRASTRUCTURE OVERHAUL

The Incredible Lateness of Delta | 72

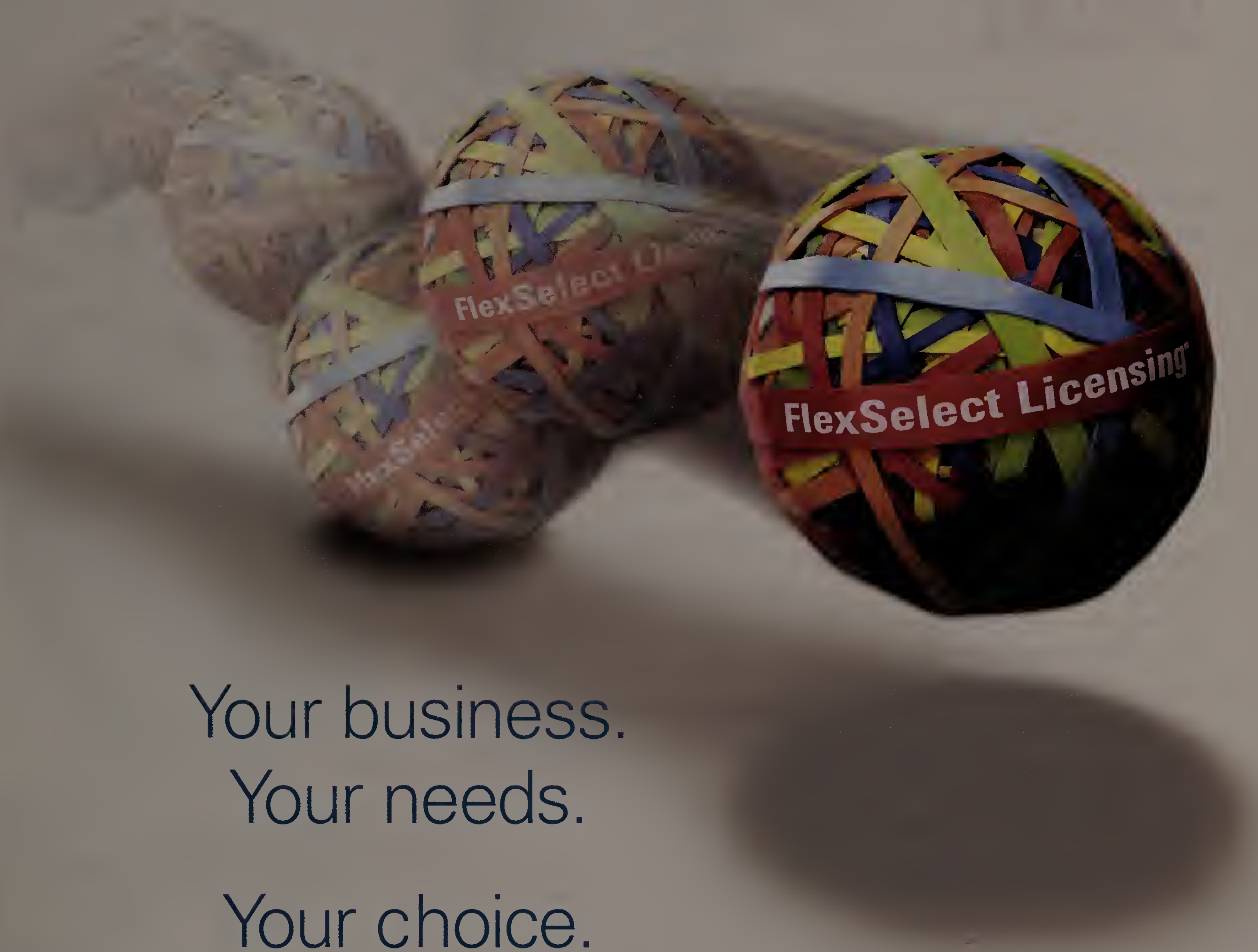
Delta Air Lines is undertaking a billion-dollar upgrade aimed at making the technology laggard an industry leader. But will unstable economic and travel environments stand in its way?
By Stephanie Overby

BOOK EXCERPT | *MAKING TECHNOLOGY INVESTMENTS PROFITABLE*

The Emotional Enigma of Intangibles | 78

There are equal measures of art and science to factoring the intangible benefits of IT investment decisions into a business case.
By Jack M. Keen and Bonnie Digrius

MORE ▶▶▶



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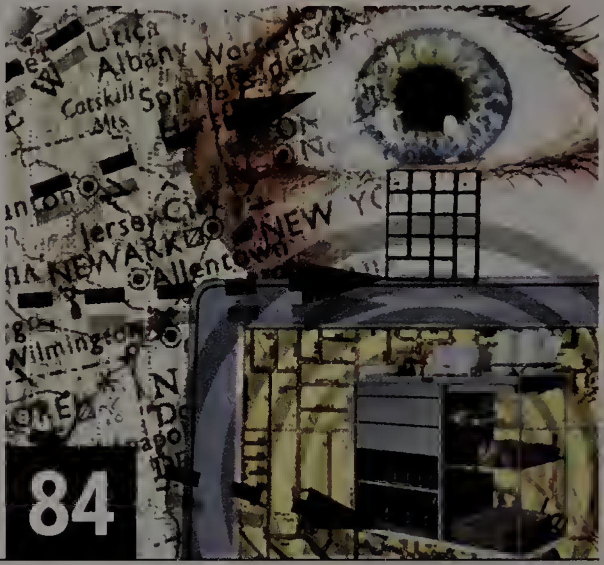
CIO

EMERGING TECHNOLOGY | 84

Tag, You're It

Many businesses that need to track physical assets are turning to radio frequency identification (RFID), a data collection technology that uses electronic tags to store identification data and a remote reader to capture information. RFID tags range in size from tiny animal tracking tags to placards slapped on shipping containers and trucks. *By John Edwards*



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Many of the aging tech infrastructures that CFOs refused to invest in will collapse by the end of 2003. *By Gary Beach*

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Touchstones that can guide you through life's crises. *By Christopher Hoenig*

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The practice of solving problems by importing best practices is not a best practice. *By Michael Schrage*

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To get business value out of new IT solutions, vendors have to get them right. *By Mohanbir Sawhney*

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RFID technology provides fast, reliable asset identification and management. *By John Edwards*

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Abstracts of all the feature stories found in this issue.

> **"CIOs should be wary of vendors that tout generic industry solutions. They should ask for solutions that are customized for their industry subsegment and for client references from similar businesses."**
>
> –Mohanbir Sawhney, Net Gains columnist, on vendor solutions **Page 42**

Trust the color printer **performing** in the Pentagon.

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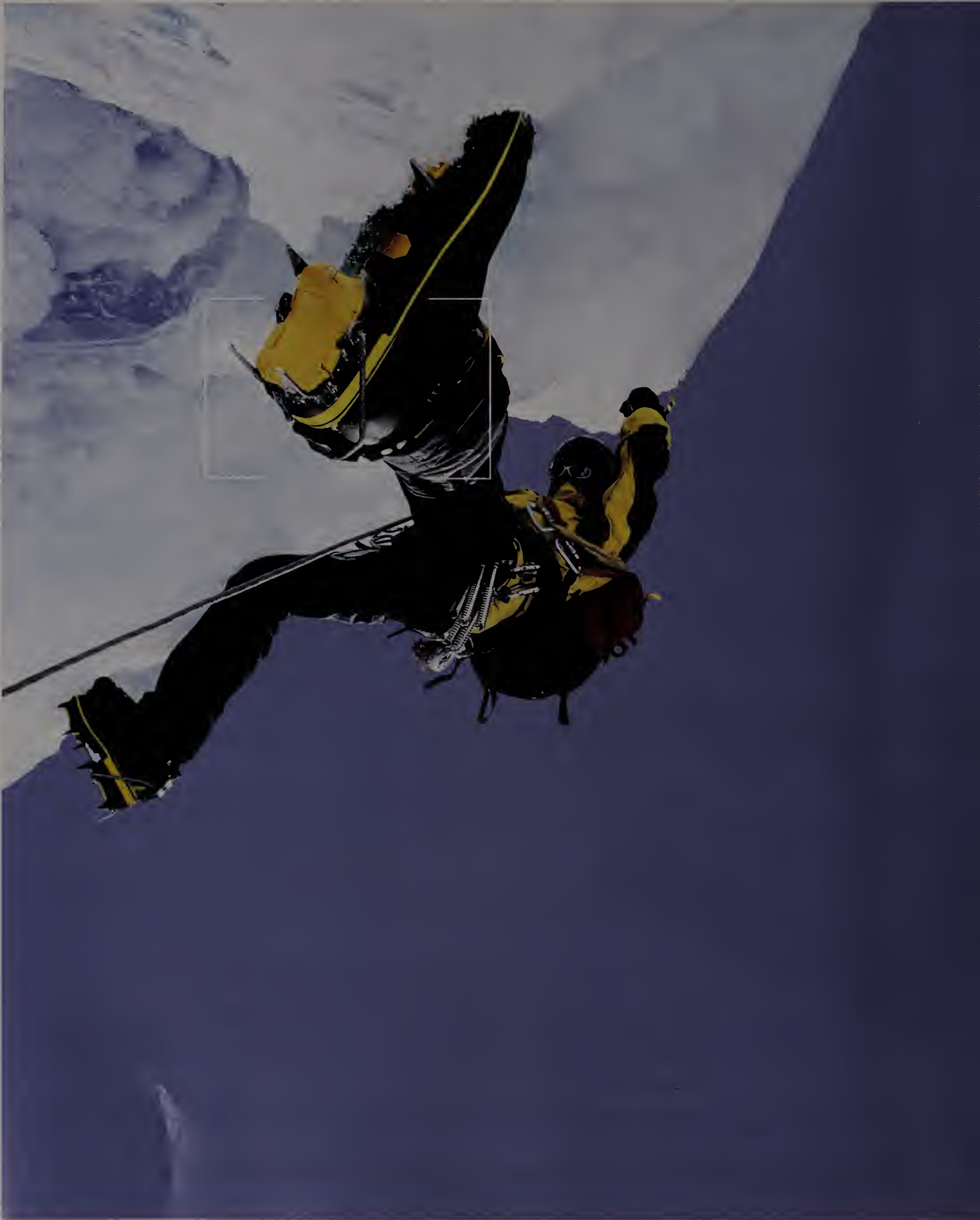

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Interactive features from February 15 through February 28

Rich Clow, vice president of technology architecture and strategy for Citi Cards

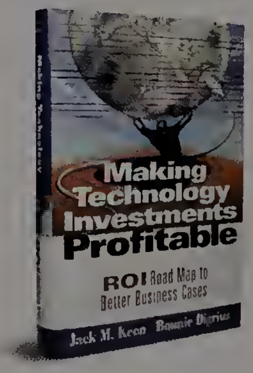
TALK BACK

Are you joining the enterprise backlash?

More and more CIOs are turning their back on the lumbering ERP and CRM implementations for smart, little point applications (see **This Could Be the Start of Something Small**, Page 54). Where do you stand? Are you going the small-is-beautiful route? Share your views—and read those of your peers. Go to *comment.cio.com/talkback*.

ASK THE AUTHOR

A good deal of business success hinges on management decisions driven by the gut feel of experience and intuition (see **The Emotional Enigma of Intangibles**, Page 78). Jack M. Keen, coauthor of *Making Technology Investments Profitable*, will be online for the next two weeks to answer your questions about turning intangibles into tangible business results. Go to *www.cio.com/books*.


Making Technology Investments Profitable
ROI Road Map to Better Business Cases
Jack M. Keen
Bonnie Digrius

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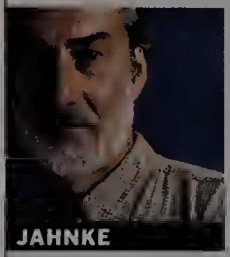
Editor's Picks
Know Where You Are



Through the magic of site logs, editors of websites know exactly which articles are being read and which are treated as if they contain a computer virus. Here at CIO.com, we know that the online section called **Analyst Corner** is a consistent winner.

Analyst Corner (*www.cio.com/analyst*) presents opinions of top industry analysts such as Current Analysis, Gartner, Giga, the Hurwitz Group, IDC and the Yankee Group. Jon Surmacz, the Web writer who reviews and selects the reports, has recently added new analysts and increased the frequency of reports to three times a week. He is now launching an e-mail newsletter called Analyst Corner Update to let readers know which technologies and strategies have been discussed by his contributing experts. To sign up, go to *www.cio.com/newsletters.cfm*.

–Art Jahnke
Web Editorial Director

Peer Resources

Check out *CIO*'s sister publications—*CSO* magazine for the chief security officer and Darwinmag.com for the nontechnology executive—for added perspective.

▶ Even your standard disaster protocols can fail—just ask Beth Israel Deaconess Medical Center (see **All Systems Down**, Page 46). At one of the nation's largest insurers, USAA, knowing how to prepare for disaster is part of the business. Read **Practice Makes Perfect** on *www.csoonline.com*.

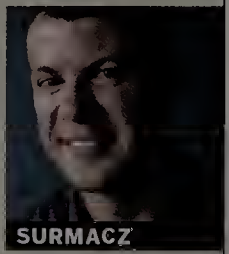
▶ A mild-mannered, conceptual CIO has to transform the FBI into an IT powerhouse (see **The Unlikeliest G-Man**, Page 66). And the FBI has to learn to share—with once-rival intelligence and police agencies. Read **Putting the Pieces Together** on *www.darwinmag.com*.

Our Daily Web

MONDAY Tech Tact Technology Editor Christopher Lindquist covers what's coming.

TUESDAY Quick Poll Read what CIOs think about current IT issues.

WEDNESDAY Metrics Web Writer Jon Surmacz makes sense of the numbers.



THURSDAY Sound Off Web Editorial Director Art Jahnke opines on ethical dilemmas.

FRIDAY The Big Picture Charts and graphs worth a thousand words.

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From the Publisher

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New "C" in Town

Gary J. Beach

THERE'S A NEW "C" TITLE IN THE EXECUTIVE SUITE.

Well, not really. But nonetheless it's fun to create new, meaningless titles. Are you ready? Let's hear it for the "CF-No" as in, "No, your customer relationship management project is not approved.... No as well to that business intelligence proposal you submitted."

Granted, I'm preaching to the choir. But the two-year reign of the CF-No, the self-proclaimed king of tech, is about to come crashing to an end. If I were a CIO, I would safeguard all the proposals I submitted to the executive management team in the fall of 2000. Why go back that far? The monthly CIO Magazine Tech Poll points clearly to November 2000 as the month when the CF-No began a palace coup in the corner office.

Our Tech Poll also reports that 15 percent to 20 percent of businesses "never slowed down" their tech purchases. Sometime in 2003, those companies—possibly your competitors—are going to introduce offerings in the market that generate revenue, enhance customer acquisition and reduce cost. Expect the call from your CEO asking why your company hasn't matched them. Alas, those fall 2000 proposals just may save your job as you remind the boss that the CF-No thumbed them down.

CF-Nos have adroitly transformed the profession of information technology from an art to a science by putting every IT project under the quantitative ROI microscope. Sure, some of the stuff CIOs offered up during the late 1990s under the guise of mission critical was junk. But not all. And there's a case to be made that the most important implementations of technology do not have a linear payback period. But don't tell that to the CF-Nos, who continue to rule the lives of CIOs with tighter financial control leashes.

That control won't last much longer. I predict by the end of 2003, there will be a plethora of very public, very embarrassing corporate IT infrastructure collapses. The culprit: aging tech infrastructures. Infrastructures that the CF-No refused to invest in during the turbulent times of 2001 and 2002. The short-lived reign of the CF-No will collapse along with those useless, out-of-date infrastructures.

The January 2003 CIO Magazine Tech Poll reported some good news: A significant percentage of businesses intend to increase tech spending throughout 2003. And, by far, most of that investment will go to new hardware and software initiatives.

My advice to CIOs is to really get to know the most senior sales executives in your company. If there's a chief marketing officer, make sure that person is high on your buddy list. And, if you want to get a new accounting or business intelligence software project off the ground, go see your CF-No with the question, Do you think our aging infrastructure can handle the newly mandated accounting requirements of the Sarbanes-Oxley Act of 2002?

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InBox

Reader Feedback

THE CIO AND PROJECT SELECTION

In his Peer to Peer column ["It's Not Your IT Portfolio—It's Theirs," Nov. 15, 2002, available at *www.cio.com/printlinks*], Paul Ingevaldson advocates leaving the financial portfolio in the hands of executives, not the IS department. But the IS portfolio of my company is my plan. Rather than having the business units drive the IT plan, I believe it is reasonable for my business partners to expect me to figure out what they are doing and how systems could make them do it better or differently. I need to match systems to the business, and then I need to make them work. If the systems don't work, then my business partners go on running the stores and buying the products, and looking for another CIO.

I do think Ingevaldson is saying that he is supposed to advise his business partners about those things. If he is not, then his business partners may be choosing their highest priority things to do. Business partners always do that, forgetting that if those things were their highest capability, those things would have already been done.

Peer to Peer

It's Not Your IT Portfolio—It's Theirs

But I don't know how business partners can determine what their IS capabilities are. They want me to figure that out. They want me to match the IS stuff with their stuff, and consider their attention level as part of the process. They want me to listen to them, speak their language, and tell them what systems we should be using and when. They want to be editors of the plan—but they want me to author it.

I just have to make sure I'm right. They have to make their numbers; I can't do that [for them].

Michael Clifford
Vice President and CIO
Whole Foods Market
Austin, Texas

When I was CIO for Mattel Toys, we had a steering committee that did exactly what Paul Ingevaldson outlines—it put the portfolio management in the hands of executives, not the IT department. It was my job to participate in strategic and tactical planning for the company. And any IT projects that were for IT itself were treated as any other functional executive responsibility and had to be justified alongside their projects.

My role was less black-and-white than Paul's. I did suggest areas that we should work on. Without input from someone who can see the whole picture, such as a CIO, the weaker business units and departments get less IT support because of their inability to even understand what is possible, let alone what is justifiable. The strong organizations dominate the IT spending, and the enterprise is only as good as its weakest link. I became a coach to those weaker organizations. This is a similar role to the CFO when it comes to planning, budgeting and controlling costs for the weaker departments.

Fred Held
Partner
Tatum CIO
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Applications seem to fall into two categories. The first is those that help a company improve its operational efficiencies. Those applications add to the bottom line and fall under the cost center scenario. Some examples are HR systems, purchase systems, ERP, PeopleSoft and so on.

The second category is those applications that connect the internal systems seamlessly to external stakeholders such as clients, partners, suppliers, even staff. Those systems do not improve operational efficiencies but add competitive value to the business. In that case they drive the top-line revenue.

As I see it, the systems that add to operational efficiencies—those that are inward-focused—need to be proposed and decided by the business unit heads. The ones that are outward-facing—adding competitive advantage to the business—may be proposed by both the CIO and business unit heads.

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Edited by Lafe Low and Michael Goldberg

GOVERNMENT I.T.

Patent Office Stops Shuffling Paper

TO WIN A PATENT takes originality. It takes persistence. And at a time when the Bush administration and Congress are pushing federal agencies to move many public services online, it still takes paper-pushing. Lots of paper-pushing, with inventors and their lawyers submitting many documents (and copying and mailing many more) to government examiners who determine whether the invention in question differs from what came before.

But this paper-shuffling system is about to change. The U.S. Patent and Trademark Office announced in December the latest stage in its two-year, $40 million project to make accessible via the Web all the documents that accompany the patent applications process by Oct. 1, 2004. That step is the addition of a storage-attached network (SAN) to let the office manage the growing need for storing and retrieving many terabytes of documents and drawings, says CIO Doug Bourgeois. "We want to provide the technical and business capability for the entire process of establishing your intellectual property rights to be conducted online," he says. A pilot project started in December.

U.S. Patent Office CIO Doug Bourgeois

The move online potentially saves time and money for inventors because it makes the document-based discussion with patent examiners easily accessible to people who can't get to he Patent and Trademark Office in Arlington, Va. "Many patents can only be upheld when understood in the context of the administrative dialogue, which helps define the meaning of the terminology used in the application," says attorney Bruce D. Sunstein of Bromberg & Sunstein in Boston.

The Patent and Trademark Office has tapped network storage vendor EMC to bring reliable access to a continent of documents relating to both patents and trademarks. We're not talking about your typical file server farm here. The agency must cope with 30 million gigabytes of data, an amount that continues to rise steadily. Each year the agency receives 340,000 patent applications, some of which can run to millions of printed pages (typically patents require more documents than trademarks). Bourgeois says the USPTO has seen storage needs grow between 25 percent and 40 percent in each of the past five years.

The USPTO's pact with EMC is interesting not just for its scale but for its pricing model. The government is paying only for the storage services it uses, Bourgeois says. The $45,000 per terabyte price tag includes storage equipment plus network switches and engineering services, he adds, all designed to help the agency "better manage its resources and achieve higher availability and better disaster recovery."

There's a lot on the line. Patents become public information in exchange for a 20-year

Continued on Page 24

STATSHOT

From Modest Beginnings

A United Nations report shows Africans' Internet access is modest but rising

31 percent: The estimated increase in Internet users worldwide from 2001 to 2002. (Total is 655 million.)

46 percent: The increase in Internet users in Africa from 2000 to 2001. (Total in 2001 was 6.7 million.)

14 percent: The increase in North America Internet users from 2000 to 2001. (Total in 2001 was 56 million.)

SOURCE: U.N. CONFERENCE ON TRADE AND DEVELOPMENT'S "E-COMMERCE AND DEVELOPMENT REPORT 2002," WHICH INCLUDES DATA FROM FORRESTER RESEARCH

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Patent Office

Continued from Page 22

monopoly on an invention. And as J. Timothy Sprehe, a records management consultant notes, "Patent records must be kept available for as long as the republic exists."

A visit to *www.uspto.gov* shows there's a lot online already. The Patent and Trademark Office has posted all its patent and trademark records from 1790 to the present (though many records were lost in an 1836 fire). On Jan. 7, 2003, for example, the United States issued 3,567 patents. The last one of the day, Patent No. 6,505,348, describes a set-top box able to provide programming data to several TVs, complete with connections to a viewer's VCR. The patent documents credit a trio of inventors from StarSight Telecast of Fremont, Calif., and cite no fewer than 49 other patents as relevant to this invention (including seven cited by the patent examiner). From application date to patent award? About three and a half years. In that time, DVD players became just as cheap as VCRs. *–Geoffrey James*

THE USPTO SYSTEM AT A GLANCE

> **Client hardware** 4,000 HP PCs

> **Client OS** Windows NT Workstation 4.0

> **Middleware** Customer workflow software developed by the European Patent Office

> **Server hardware** Several hundred HP servers

> **Server OS** HP-UX and Windows NT Server 4.0, migrating to Windows 2000

> **SAN** EMC Symmetrix networked storage with ControlCenter management software

> **Availability** Piloting of "wrapper" capability in June 2003

> **Cost (SAN only)** $45,000 per terabyte (includes storage equipment, switches and engineering services)

SOURCE: U.S. PATENT AND TRADEMARK OFFICE

I.T. LEADERS

A Hit with Kids

COMPUTER SCIENTIST Philip Emeagwali knows how to connect with kids. His website (*www.emeagwali.com*) receives 10,000 hits a week from middle school students doing homework. Emeagwali, 48, is one of those named to the 2003 list of the 50 Most Important African-Americans in Technology. His website is also part of a new teaching curriculum called "The Soul of Technology" and a related exhibit at the African-American Museum and Library in Oakland running through May 15, 2003. A native of Nigeria, Emeagwali won the 1989 Gordon Bell Prize for his work with supercomputers. *–Lafe Low*

Philip Emeagwali's website serves as a popular resource for school children.

PRIVACY

Keeping an Eye on the Joneses

GETTING THE DIRT on your neighbors has never been easier. As more public records are made available online, the country's court systems are now reevaluating what they think should be kept hidden from nosy Internet users while maintaining the public's right to know.

Certain criminal and civil courts in Florida and Ohio are publishing all their public records online. For example, anyone can use Ohio's Hamilton County court website free of charge to see which Cincinnati residents have received eviction notices. Other courts charge for access to records, but whether there's a fee is only a small part of the issue.

These records have always been public, but the National Center for State Courts (NCSC) and the Justice Management Institute (JMI), based in Williamsburg, Va., and Denver, respectively, are questioning whether posting them online makes them "too public" and encourages identity theft. After all, a quick website search hardly compares with digging through a local courthouse's filing cabinets.

The NCSC and JMI have published guidelines for courts to help them rethink what they post. Those guidelines suggest keeping sensitive information offline, like Social Security numbers and family law proceedings. States will have to balance the principles of the Freedom of Information Act, which mandates that these records remain public, with whether the nitty-gritty of court cases needs to be online.

–Sarah Johnson

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Off the Shelf

Edited by Carol Zarrow

Rich Man, Poor Man

Globalization and Its Discontents
By Joseph E. Stiglitz
W.W. Norton & Co., 2002, $24.95

JOSEPH STIGLITZ has the courage of his naiveté.

A winner of the 2001 Nobel Memorial Prize in Economics, a member of President Bill Clinton's cabinet, former chairman of the Council of Economic Advisers and chief economist of the World Bank, Stiglitz declares himself shocked—shocked!—to discover that decisions made by the World Bank and the International Monetary Fund (IMF) are driven not by practical assessments of economic conditions but by politics and ideology. Specifically, by politics that ensure Western profits, rationalized by the belief that no matter what the cost, nothing should be allowed to interfere with the freedom of markets.

And even that belief, when put into practice, is tainted by hypocrisy, Stiglitz observes. The IMF beats the drum for transparency while conducting its deliberations in secret. It orders governments to get out of the market while winking as Americans and Europeans subsidize their own farms. It demands that developing nations eliminate trade barriers while the Western powers get to keep their own. In short, globalization, as currently practiced, is, according to Stiglitz, a cruelly efficient engine of exploitation. Its benefits redound to the rich. The poor, without exception, get poorer.

Stiglitz's book is both a documentation of his argument (with examples drawn from IMF-caused market disasters in Asia and Russia, among others) and a cri de coeur to return the IMF to its original purpose: collective action at a global level for economic stability. Until that should come to pass, both the people oppressed by globalization and those reaping its benefits will be locked in a morbid relationship that will, ineluctably, lead to misery and its stepchild, violence.

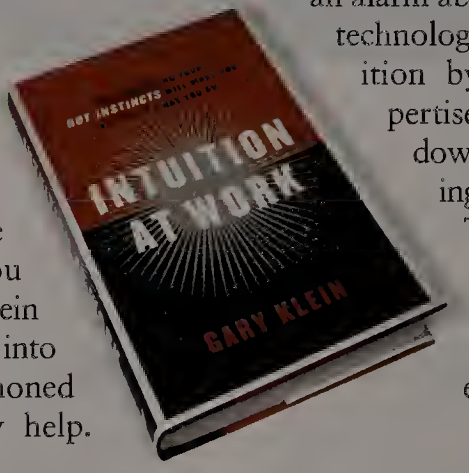
The defining nature of globalization is that it involves everyone. One ignores Stiglitz's book at one's peril.

–David Rosenbaum

Tutoring Intuition

Intuition at Work: Why Developing Your Gut Instincts Will Make You Better at What You Do
By Gary Klein
Currency/Doubleday, 2003, $26

IF YOU'RE ONE of those people who think intuition is the exclusive domain of the Psychics Network, don't waste your time with Klein's book. But if you believe that intuition—which Klein defines as experience translated into action—is a skill that can be honed with practice, this book may help. Through exercises and examples, Klein aims to teach readers how to blend intuition with analysis, how to speed the process of intuitive learning and how to clearly communicate intuition to colleagues. Most important for CIOs, Klein sounds an alarm about how information technologies can cripple intuition by disabling the expertise of people, slowing down learning and teaching dysfunctional skills. The book also provides specific advice about ways to combat IT's devastating effects.



–Megan Santosus

CIO Best-Seller List

5 What Management Is: How It Works and Why It's Everyone's Business
By Joan Magretta
The Free Press, 2002

4 Leadership on the Line: Staying Alive Through the Dangers of Leading
By Ronald A. Heifetz and Marty Linsky
Harvard Business School Press, 2002

3 Leadership
By Rudolph W. Giuliani
Miramax Books, 2002

2 Who Says Elephants Can't Dance? Inside IBM's Historic Turnaround
By Louis V. Gerstner Jr.
HarperCollins Publishers, 2002

1 Globalization and Its Discontents
By Joseph E. Stiglitz
W.W. Norton & Co., 2002

SOURCE: JAN. 15, 2003. DATA COMPILED BY WORDSWORTH BOOKS, CAMBRIDGE, MASS.

THE NEW BOOKSHELF

"The Athenians' individual-centered values of freedom and equality remain profoundly influential today, and Athenian democracy itself stands as a shining example of the resilience of an organization based on a culture of citizenship."

From *A Company of Citizens: What the World's First Democracy Teaches Leaders about Creating Great Organizations*, by Brook Manville and Josiah Ober (Harvard Business School Press, February 2003)

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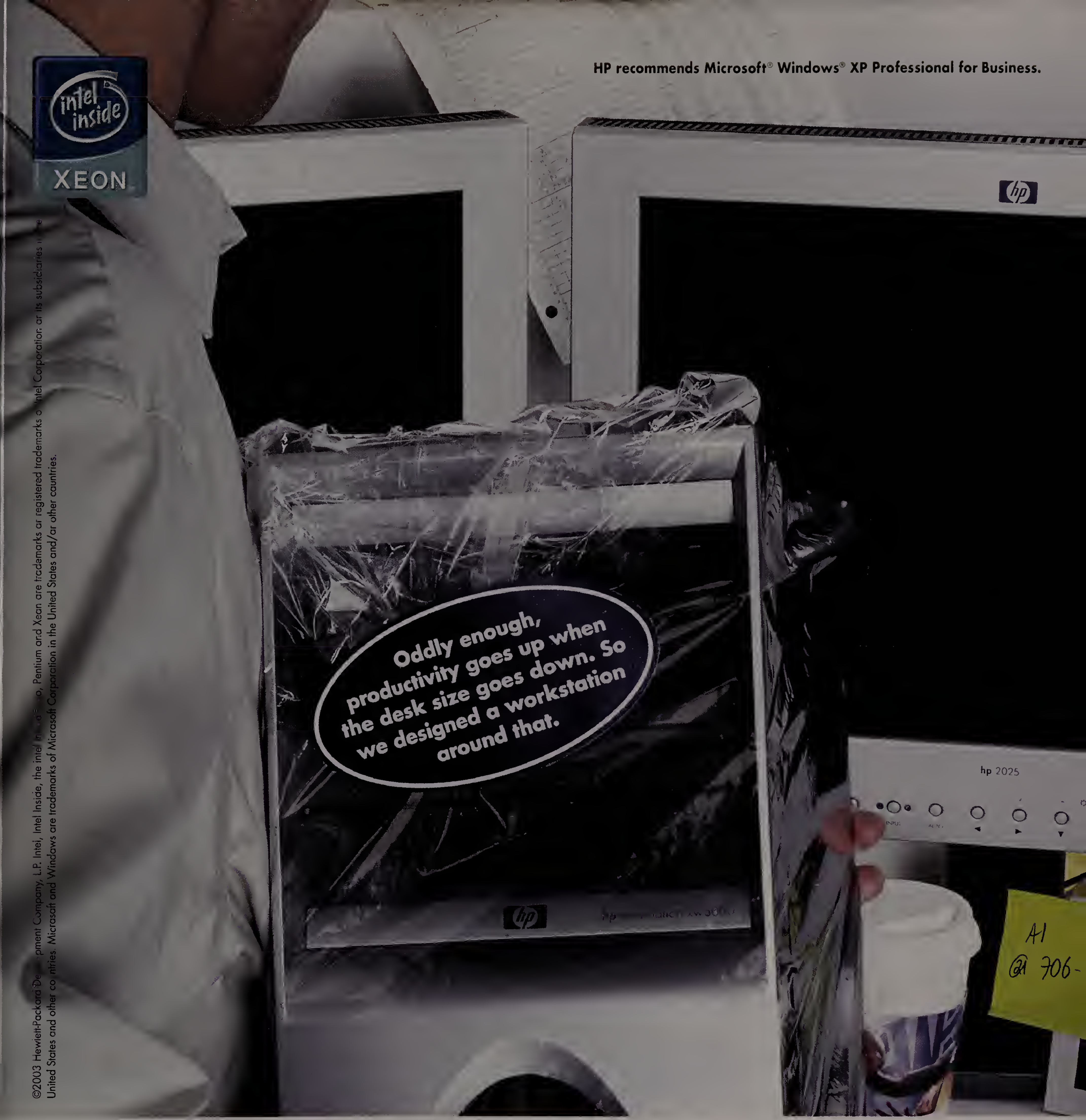
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CIO ROLE

Lessons from Unicef's CIO

EARLY IN HIS TENURE AS CIO of the United Nations Children's Fund (Unicef), Andre Spatz met some resistance to his arguments for increased IT spending. After all, why would anyone buy new software when they could help more children who needed medicine and books?

Thanks to Spatz, managers at the humanitarian relief agency now see IT as improving both programs and fund-raising efforts. And that makes him a CIO worth listening to.

From his office with a view of U.N. headquarters, Spatz sounds appropriately diplomatic. "At Unicef, it was possible to energize people and energize them around a vision, to execute that vision instead of debating what our vision would be," he says.

When Spatz, 48, joined Unicef in 1997, the New York City-based United Nations as a whole was under pressure to institute better management controls. Spatz's mandate: create a centralized IT function and replace legacy systems; oversee the implementation of an SAP R/3 ERP system to manage corporate financials and other functions; establish a communications infrastructure (including e-mail and voice over IP) to support 6,000 employees, including field workers in 240 sites in 162 countries and territories, fund-raisers in Tokyo and Brussels, Belgium, and a supply operation in Copenhagen, Denmark; and do it all for as little money as possible.

In meeting those goals, Spatz moved IT from afterthought to center stage—a significant shift. Agency executives can now track spending on specific programs around the world in a uniform way in close to real-time, says CFO Ellen Yaffe. That process used to take months. Field workers in Africa and Asia can communicate with regional managers. Most important, the new business processes (including a project portfolio management approach) and the IT systems that support them have changed the culture at Unicef.

"Andre brought to us in pictures what it really took to have global connectivity, to have the right infrastructure, the right staffing. We were moving into an era where we were becoming totally dependent on technology, and we didn't understand what implications that would have," Yaffe says.

The changes, however, were not immediately embraced. "This was going to cost a lot of money; it was going to take away from humanitarian programs," she says. "But it would also make us more efficient and help us to improve fund-raising. It's only in the last year or so that people are starting to understand that."

Spatz, a native of Vevey, Switzerland (also Nestlé's hometown), cites the following as some of his largest lessons learned.

Deliver quality. Spatz embraces an IT service management standard known as IT Infrastructure Library, after a British government model that documents best IT practices and guarantees quality-of-service levels (including a 24/7 global help desk).

Credibility is a CIO's most important asset. Delivery on promises is a must, even if they are not initially big promises. "Building trust is not a quarterly based thing," he says. "It goes over time."

Listen—a lot. Soon after Spatz joined Unicef, he visited regional management teams to share his strategy and solicit feedback. He says that process helped him win buy-in and mobilize resources.

Share a big-picture view—of everything—often. "You have to have a mosaic view of the world and know which pieces will impact which others," Spatz says. Explaining how small projects affect Unicef's overall progress helps him energize employees, he says.

View IT infrastructure as a business enabler, not a utility. This is important for any company but more so with Unicef, Spatz says. He has a modest IT budget (he declines to share figures), but a strong infrastructure adds cumulative value with each new application and function.

"Some of the strategic elements that we put in place at the start, we didn't realize their importance," Spatz says. "Now it's taken for granted that we have a global help desk available 24/7." *--Michael Goldberg*

"There's no magic in all of this. In the way you lead an organization, you must create an atmosphere that allows people to work. And success, that breeds motivation."

PHOTO BY STEVEN VOTE

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Washington Watch

Edited by Elana Varon

SEC Rule Creates Opportunity for CIOs on Corporate Boards

WHEN THE SECURITIES and Exchange Commission ruled last month that corporate audit committees must include an accounting expert, officials unintentionally created an opportunity for CIOs to play a critical role on corporate boards.

The rule, which was expected Jan. 26, is the SEC's interpretation of the Sarbanes-Oxley Act, Congress's response to the recent rash of corporate financial scandals. The rule says that audit committees of publicly traded companies must include five financially literate members, one of whom should be a "financial expert"—a professional accountant or CFO with experience preparing or auditing financial statements for such companies. Financial experts, the SEC hopes, will spot fraudulent or misleading reports and in the process help restore investor confidence.

However, financial savviness isn't enough to ensure corporate integrity, say some corporate watchdogs. "Now that all the talk is about financial scandals, people are losing sight of the need for a wide range of expertise," says Charlie LeGrand, technology practices director with the Institute of Internal Auditors, a professional association for corporate auditors based in Altamonte Springs, Fla. The American Institute of Certified Public Accountants, which lobbied to require five financial experts on board audit committees, acknowledges that the emphasis on financial expertise comes at the expense of other knowledge. They say this shortcoming could be alleviated by having other experts, like CIOs, on corporate boards—and possibly chairing a board technology committee.

Richard Hughs, a professor emeritus and former dean at the State University of New York at Albany School of Business, says one way CIOs can help is by advising auditors whether companies are spending their IT budgets wisely. More important, says Hughs, the CIO can help the auditors understand what kind of business data is contained in a company's systems that they can use to fulfill their fiduciary responsibility.

As of now the SEC has no plans to require a technology expert to be on corporate boards. But, says LeGrand, forward-thinking companies already do (see "Get on Board," Jan. 15, 2003). In the meantime, CIOs can start with their own company, helping their CFO understand how to use corporate systems to generate more accurate financial statements.

–Ben Worthen

New Task Force Chairman Would Pump Up High-Tech Sector

ONE OF THE TOP advocates for high-tech policy in the new Congress is a former veterinarian who's turned his personal interest in technology gadgets—from cell phones to pagers—into a full-time job on Capitol Hill. Sen. John Ensign (R-Nev.), a member of the Senate Commerce Committee, which handles much technology legislation, is now the new chairman of the Republican party's Senate High-Tech Task Force.

The task force works with the high-tech industry on legislation that helps promote the development and use of information technology. At the top of Ensign's agenda this year is to reinvigorate the struggling sector. Part of his plan is to provide tax relief for high-tech companies that bring jobs home from offshore.

Sen. John Ensign

He's also planning to keep working on a set of perennial issues, including promotion of digital television and advanced wireless technologies, and protecting children from Internet pornography.

Ensign founded and operated the first 24-hour animal hospital in Las Vegas before being elected to the House in 1994. He was elected to the Senate in 2000. Among the laws Ensign has sponsored are the Aviation Security Enhancement Act, which mandates airport terminal buildings be modified to accommodate explosive detection systems for screening checked baggage, and the Dot Kids bill, which aims to create a "safe zone" for children on the Internet, free from pornography and other unsuitable material.

–Julie Hanson

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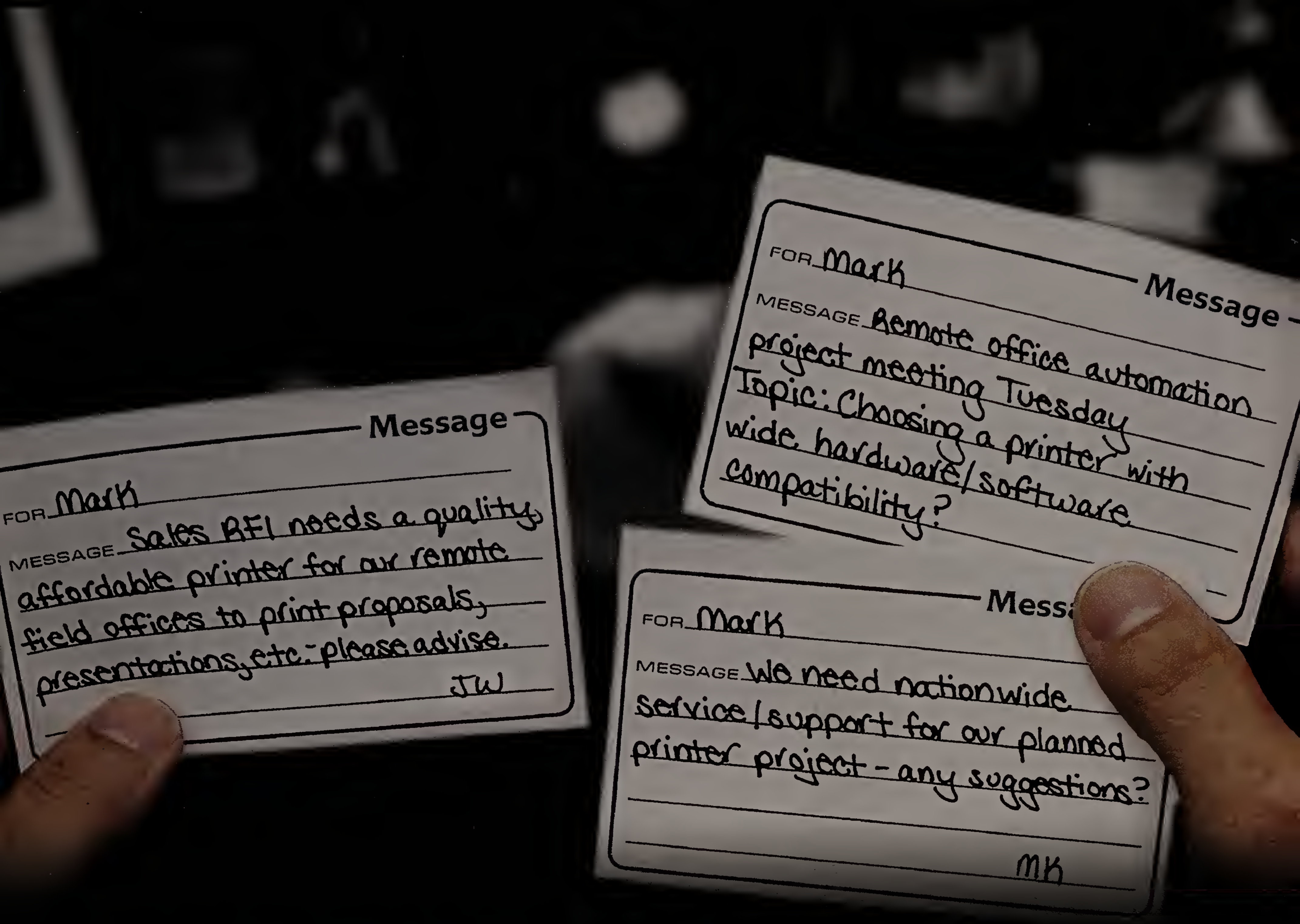
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FOR Mark

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FOR Mark

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WEB TECHNOLOGIES

All-in-One Appliance

THE REFRIGERATOR is a symbol of bounty—often the centerpiece of any kitchen. Now, with the addition of a 15.1-inch liquid crystal display, hi-fi speakers and a DSL hookup, the refrigerator assumes even greater presence and functionality. Korean manufacturer LG Electronics has given the venerable refrigerator the capability to send and receive e-mail, surf the Web, watch TV, play MP3s, keep track of birthdays, organize recipes and monitor the expiration date on that milk carton.

You're not alone if you think this sounds outlandish. Tom Cooper, a salesman with P.C. Richard & Son, an appliance retailer with 44 stores across New York and New Jersey, says his customers' reactions to the 356-pound, 26-cubic-foot appliance are mixed. "Some people are blown away by it," he says. "Some people think it's silly." Most people think it's cool with its titanium finish and numerous features, he adds.

The LG Electronics refrigerator: MP3 tunes and e-mail along with tracking freshness dates.

With its $8,000 price tag, though, LG's Internet fridge hasn't been a big seller in Coopers' wealthy South Hampton, N.Y., location. In fact, as this issue went to press, Cooper's store hadn't sold a single one. Nationwide, LG shipped approximately 300 units within the first six weeks of its October 2002 release in the United States, according to Daniel Lee, LG's director of marketing communications. During that time, appliance retailers nationwide shipped nearly 1.5 million "normal" refrigerators, according to *Appliance* magazine.

Cooper believes Internet fridge sales will pick up this spring, when construction on new homes kicks into high gear. "This is something that would go into new constructions because of its dimensions," he says. In any event, the Internet fridge has been generating a lot of buzz, if not a lot of actual sales. "We decided to bring it in because a lot of customers were calling us because they wanted to see it," Cooper says. "Everybody's interested in it."

–Meridith Levinson

PORTABLE TECHNOLOGIES

Now Playing—Anytime, Anywhere

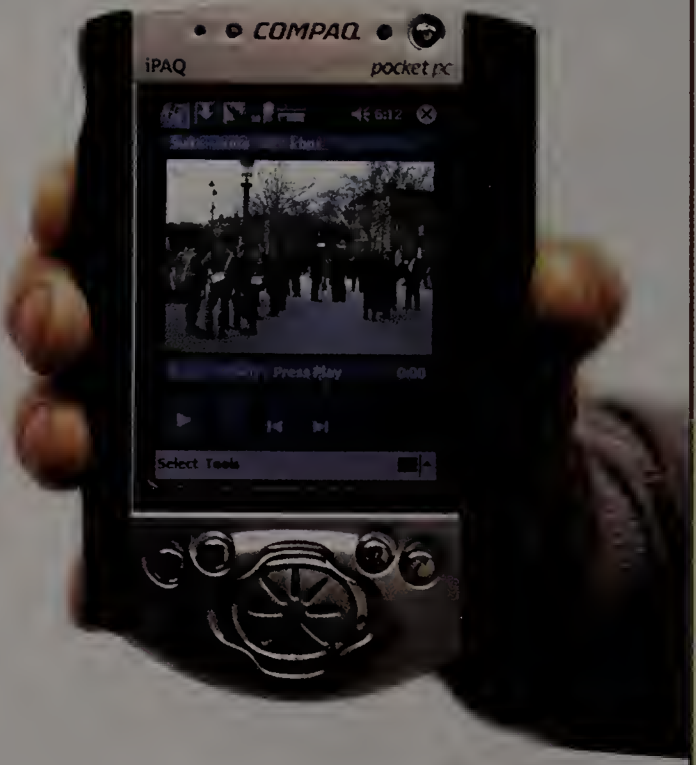
DARRELL GRIFFIN HATES TO FLY, so it was with no small degree of trepidation that he faced a flight from Los Angeles to New York a couple of years ago. Desperate for a distraction, Griffin, a film producer at the time, turned to his business partner for help. "To take my mind off the flight, he put a film on my handheld PC," Griffin says. The movie was *Hercules Unchained*, starring Steve Reeves. The diversion worked, and by the time Griffin landed in New York, he had an idea for a new business.

When they returned to L.A., Griffin and his partner sat down to figure out how they could turn that distraction into a business. "Pocket PCs are synced up all the time," Griffin says. "We wanted to figure out how to create a retail product." They devised a technology to compress filmed content from CD-ROMs into a format PDAs could display. Then in November 2001, Griffin helped launch Pocket PC Films, in Sherman Oaks, Calif., to distribute video content for Pocket PC and Palm OS devices. Film fans can buy CD-ROM titles, load them on their computer and sync them into their handheld device. (The films will also run on desktop PCs, but the format remains handheld-size due to licensing issues.)

Griffin, now president of Pocket PC Films, has high hopes. "The market is growing faster than we thought," he says. "Dataquest estimates that 23 million PDAs will be shipped in 2003, but that was before Dell and ViewSonic announced plans to offer models."

Pocket PC Films now distributes 25,000 titles, priced from $9.99 to $49.99, that run the gamut from 1941's *King of the Zombies* to Oliver Stone's more recent *Natural Born Killers*. The company also provides self-help and business-oriented content, as well as classic TV packs with shows like *Dragnet* and the *Sports Illustrated*'s "Swimsuit 2002" special—the most popular title so far.

–Megan Santosus



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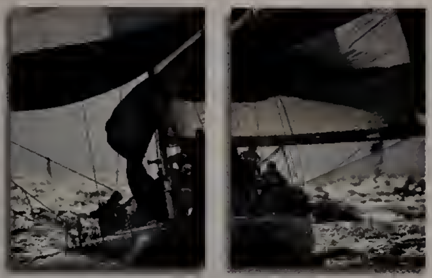

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Consult Your Moral Compass

Touchstones that can guide you through life's crises

BY CHRISTOPHER HOENIG

ILLUSTRATION BY VIOLET LEMAY

REAL MOMENTS OF TRUTH last far longer than a moment. They are high-stakes decisions about agonizing moral dilemmas and sometimes indistinct trade-offs where deliberate thought and action is required.

Every moment of truth is like a storm on a leader's long voyage through life. Getting through these storms alive and well requires many choices. Some are made in public—for example, hard decisions about your staff. Some are made in collaboration, such as executive committee choices on corporate strategy. But most are made quietly, when no one is looking. It is how you behave when no one is looking—facing the forces of human nature—that molds your character, your leadership ability and your career.

Triumph in a moment of truth is about both doing the right thing and getting the right thing done well. Success requires preparation and a combination of decisiveness and reflection. In facing the chaos and disorder of challenging experiences, it helps to have touchstones to frame your response.

My touchstones come down to four elements that can be influenced and a fifth factor that can't. If you have a knowledge of the forces at work around you, a strong moral frame of reference, solidly built character and leadership ability—plus some good fortune—you can emerge from difficult situations stronger, wiser and more successful.

The Forces at Work

In most moments of truth, you will be at the mercy of elemental human forces that drive who we are—among them ego, shame, greed, desire, fear and fallibility. These human traits cannot be suppressed, but they can be understood and sometimes channeled. Fear can turn to insularity, indecision, panic and paranoia. Or fear can drive awareness, focus, courage and confrontation.

A pivotal moment for me occurred when I worked as a consultant, and under the influence of jet lag, lack of sleep and a 14-hour day, I left a stack of sensitive materials in a parking lot. In the middle of the night I woke up and realized my mistake,

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If your data center is sucking more money from the bottom line than it's adding to the top line, it's time to turn things around. It's time to reestablish your data center as a competitive weapon. As the means by which you improve customer experiences and relationships, deliver new loyalty-driving services and maximize efficiencies throughout your company.

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immediately buffeted by fear, shame and the desire for self-preservation. It took me hours of deliberation to come up with a plan.

In the morning, before anyone could confront me, I walked straight into the office of the client's CEO, confessed the magnitude of my error, took full responsibility and asked that he blame me, not my firm, and remove me from the job. After a moment of hesitation, he smiled and said I had just displayed the kind of character he wanted working for him and that he would be proud to have me continue on the project. A narrow escape.

A Moral Frame of Reference

Even if you understand the forces at work around you in a crisis, making the right choices requires a clear, moral frame of reference. This may come from one or more underpinnings: your upbringing, your friends, religious teachings or the law. The more of these sources you can use to frame a choice, the more robust your decision making in tough, ambiguous environments. A strictly legalistic or regulatory frame of reference, for example, will not support you in situations that are outside the strictures of the law or do not have a right answer.

> **Making the right choices requires a clear, moral frame of reference. This may come from one or more underpinnings: your upbringing, your friends, religious teachings or the law.**

Some of my most difficult moments of truth involved weighing loyalty to colleagues against the interests of stakeholders I was representing. When people I trusted and respected were beginning to operate beyond their ability—and this sometimes included myself—it took a strong sense of right and wrong to avoid simple notions of blame or accountability. Firing a key team member, for instance, might appear an easy resolution, but it could also have threatened the very interests I was responsible for by provoking unconstructive responses from other team members. Instead, I forced myself to carefully parse my responsibility and that of others, confront everyone with the gaps we faced as a team, and try to prepare us for bringing in others who would strengthen our collective ability but also diminish our personal wealth and position. Not an easy task.

The Bulwark of Character

You must have a solidly built character to weather a crisis. The dimensions of character include courage, resilience, humility, patience, tolerance and humor. Understanding your strengths and flaws can help you avoid situations where tremendous pressures are brought to bear, your strengths are of little help and your vulnerabilities are exposed—which is a recipe for disaster.

I remember several moments in my most important relationships—personal and professional—when I was confronted by terror, betrayal, seduction or greed. I felt the tug of simple solutions: to run away and escape, to grasp for safety and rescue myself, to give up and let the waters close over me. It was only the model of my parents—the shining examples of leaders I have known—and the strength of my own character that allowed me to stay at the helm, maintaining shreds of hope and faith, while I steered for a safe harbor that often seemed far beyond the horizon.

Navigational Ability

No less important than a moral frame of reference and solid character in getting through very difficult situations is talent in navigation and piloting. This requires skill at decision making, a mental library of similar tactical situations, and maneuvering skills that demand a sense of pace, timing and a feel for the environment around you.

In selling my latest venture in face of the recent market crash, the collapse of the venture capital markets and the loss of my business partner to an active-duty call-up by the armed forces after 9/11, I knew most of what we were up against. But it still took more than 10 months of pure tactical negotiation, mediation, counseling, hand-holding, coaching, struggle and confrontation to actually execute the decisions and balance the risks and rewards to get to a reasonable outcome.

Because so much of what I've discussed here is deeply personal, writing this column became a moment of truth for me. Would I have the courage to discuss my most difficult experiences? Or was I going to gloss them over with a few expedient themes? In keeping with the spirit of this column, I've tried to follow the former path. If you can do the same with your own touchstones, you will find lessons that will make you a better leader. But more important, you can go forward on the most significant of journeys, becoming a better person.

Share your moments of truth by writing us at *leadership@cio.com*. Christopher Hoenig has been an entrepreneur (CEO of Exolve), consultant (McKinsey & Co.) and inventor, and he is the author of *The Problem Solving Journey: Your Guide for Making Decisions and Getting Results.* He is a director of strategic issues for the General Accounting Office.

PHOTO BY KATHERINE LAMBERT

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Worst Practice

The practice of solving problems by importing best practices is not a best practice

THE MANUFACTURING ARM of a major fashion retailer (MFR) wanted a world-class "production tracking system" for its rapidly expanding chain of stores. Inventories and deliveries had been getting dangerously out of hand. The heads of production and IT agreed to collaborate. They sensed a big win.

They retained a (very expensive) consultant to identify best practices for monitoring the flow of goods in global retailing supply chains. Just to make sure, the tracking system design team traveled the world to benchmark the best. They did a good job.

After intense internal debate, the team concluded that a best practice implementation should track products beginning from the contractor's factory floor rather than from the shipping dock. In close consultation with finance, the team presented its plan to the MFR's operating committee.

When the committee grasped the proposal's implications, its members went ballistic. The proposed tracking system might assure timelier deliveries and potentially save more than a hundred million dollars, but it would radically reduce the flexibility and discretion of the MFR's buyers. The software would highlight last-minute order changes and their associated costs. It thus would make buyers accountable for costs as well as sales. The buyers would revolt.

Precisely because the company fancied itself more a merchandising trendsetter than a mere merchant, its buyers ruled. The CEO had been a buyer. The plan was killed.

Instead, the design team was instructed to come back with a production tracking system that produced the greatest economic efficiencies with the minimum organizational unhappiness to the buyers. Six months of buyer focus groups and analysis later, production, IT and finance *still* couldn't devise a tracking system that would pay for itself. The best practice benchmarking proved to be meaningless.

The moral of this story? Best practice isn't. Best practice is a fiction, a lie and a con job that has ruined the credibility and reputation of many good CIOs. CIOs should never, ever allow their IT investments to be determined by anyone else's best practices. Instead, CIOs should find ways to creatively challenge every effort made to import best practice transformations into their company.

Why? Because even the most brilliant analysis of a best practice has virtually nothing to do with the ultimate effectiveness or impact of its implementation. Most overweight people fully grasp the best practice of exercising more and eating less. Alas, they tend to do neither consistently.

In reality, identifying best practices is astonishingly easy; implementing them is astonishingly hard. Telling American Airlines to be more like Southwest or advising HP to be more like Dell is an act of intellectual laziness and professional cowardice. Someone telling your company that you would be so much more agile, responsive, innovative and profitable if only you emulated the best practices of Company X is similarly mindless and gutless. But C-level executives do this to themselves all the time.

The root of the problem is that organizations have foolishly inverted means and ends. A best practice should *never* be the goal; it should be a means to an end. MFR's major mistake was defining its growing problems with excess inventories and delayed deliveries as an opportunity to create a best practice-driven production tracking system. The company would have been better off if management had defined explicit inventory and delivery objectives and then challenged its departments—buyers included, of course—to recommend viable solutions. Would those proposed solutions likely represent a best practice? Of course not; the best is seldom a creature of compromise.

"What should we imitate?" and "Who should we imitate?" are reasonable questions any organization should be constantly asking. But they also beg the critical question of how well do we imitate the best practices of others.

Sometimes the answer to that question determines whether a key business process evolves into a "core competence" or gets outsourced. But CIOs know that effective implementation requires more than imitation. Effective implementation requires companies to constantly assess the trade-offs between adoption (lifting a solution outright from someone else) and adaptation (customizing it). If there's a single best practice CIOs should own, it's giving their company the technologies and tools to decide which trade-offs are the best for it. In the final analysis, that's the only best practice that's both sustainable and honest. CIO

Michael Schrage is codirector of the MIT Media Lab's eMarkets Initiative. He can be reached at *schrage@media.mit.edu*.

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Net Gains

Creating Value Through IT

The Problem with Solutions

To get business value out of new IT solutions, vendors have to get them right

BY MOHANBIR SAWHNEY

ILLUSTRATION BY STEVEN DANA

IN THE HEADY DAYS of the technology business, vendors could push products and leave CIOs to figure out how to make those products deliver business value. Nowadays, CIOs are more demanding. They want vendors to sell them solutions, not products. They want vendors to make different products work together, to customize products to their business and to augment their products with professional services. As a result, every major technology vendor is scrambling to improve its capability to design and deliver solutions.

But getting solutions right is difficult for vendors that are used to thinking in terms of products. In my work with technology companies, I find that few vendors get their approach to solutions right. For CIOs, choosing vendors that understand how to deliver solutions with value can spell the difference between the success and failure of a project.

Potholes on the Road to IT Value

Here are some common pitfalls that CIOs should watch out for in evaluating vendor solutions.

The "One-Size-Fits-All" Solution: A solution, by definition, needs to be tailored to the customer's business. Technology vendors that pay lip service to customization often end up creating one-size-fits-all solutions that appeal to nobody in particular. Consider a vertical market like financial services. Within that market segment there are many subsegments, such as regional commercial banks, mutual fund companies, investment banks and hedge fund companies. Those subsegments may have very different business processes, legacy IT infrastructures and end-customer needs.

CIOs should be wary of vendors that tout generic industry solutions. They should ask for solutions that are customized for their industry subsegment. They should also demand that vendors provide references from clients whose business context is sufficiently similar to their own.

The "Wolf in Sheep's Clothing" Solution: If you were ever forced to wear hand-me-down clothes that were too big for

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you, you will understand this problem. Technology vendors typically design their solutions for large enterprise customers. Most vendors believe that more features and services can never hurt customers, so they try to shoehorn solutions that are optimized for large enterprises into the small and medium business (SMB) market. As a result, SMB customers are forced to buy feature-laden, complex products and services.

If you're a CIO at a small or midsize company, a good test of this problem is to examine the differences between the "enterprise version" and the "SMB version" of a solution, to see if you're being sold an overengineered solution in disguise. Also, ask vendors if they have a dedicated sales, partner and support channel for SMB customers. You'll get little attention from "trophy hunters" who are more interested in big game than in a small fry.

Before a vendor starts designing your solution, make sure it understands your real problem.

The "Just in Case" Solution: Sometimes vendors don't quite know who they are designing their solutions for or which customer problems they are addressing. They throw everything but the kitchen sink into their products and services just in case some customers find them useful. But most of these product features or service bundles have no value to most customers. Users end up confused and frustrated as they wade through a laundry list of features looking for the subset they need.

CIOs should probe vendors on what product and service features they have deleted from their standard offering so that the solution consists of just-in-time, not just-in-case, functionality.

The "Vaporware" Solution: When CIOs hear vendors' claims of "end-to-end solutions" backed up with elegant white papers, they should take the claims with more than a pinch of salt. Ask these four questions to determine whether the advertised solution is more than vaporware.

1. Does the vendor have an established model for customer engagements, whether it's vendor-led, partner-led or a joint approach?

2. Who will be accountable for designing and delivering the solutions: the vendor or the partners?

3. Does the vendor have a solutions organization that spans sales, professional services and support?

4. How many real client references can the vendor produce for the solutions it advertises?

Generating Value with Solutions

Fortunately, there are ways to make solutions work for CIOs and their technology vendors. They include:

Start with the problem: Before a vendor starts designing your solution, make sure it understands your real problem. That will require vendors to observe customers, learn about their businesses, map their business processes and understand their needs. Then customers are more likely to get solutions that are relevant to their business, instead of solutions that are of limited value.

Design whole offerings: Solutions don't necessarily require products to be customized for each customer segment. While some customization is inevitable, customers' specific requirements can be addressed in other ways. These include add-on modules, third-party products, services, customer toolkits, support channels, partners and even pricing schemes. Vendors and customers should work together to take advantage of customization possibilities on all dimensions of the total offering.

Create "products" from services: To design solutions, vendors inevitably have to add services to their product offerings. These services may support application engineering, integration and maintenance, among others. Such services initially may require tailoring for each customer. However, as vendors gain more experience, they can encode this tacit knowledge in standard processes, templates, tools and software code. Consultancies such as Accenture and McKinsey have created relatively standard service lines that can be cost-effectively scaled. Service products provide customers with more predictable support. Vendors will improve their gross margins and reduce their dependence on key employees by not reinventing the wheel for every engagement.

Let customers customize: The best way to help customers avoid having to pay for features or services that are of no value to them is to allow them to buy solutions à la carte instead of selling them bundled. Companies such as Dell, Dow Chemical and Baxter Healthcare allow customers to choose product features, add-ons, services and support channels that best suit their needs, using vendor-provided menus and configuration tools. The self-service model ensures that customers get only what they need and eliminates the need for the vendor to have to figure out the exact solution configuration for each customer.

IT solutions done right benefit CIOs by improving the business value they get from technology vendors. And a solutions orientation can help vendors improve customer satisfaction and open up new revenue streams. By avoiding the common pitfalls in thinking about solutions and by following these simple tips for solutions design, customers and vendors alike can improve the odds of success in technology projects.

How does your company think about solutions? E-mail *netgains@cio.com*. Mohanbir Sawhney is the McCormick Tribune professor of technology at Northwestern University's Kellogg School of Management. He can be reached at *mohans@kellogg.northwestern.edu*.

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ALL SYSTEMS DOWN

A blow-by-blow record of one of the worst health-care IT crises in history and what CareGroup CIO John Halamka learned from it

BY SCOTT BERINATO

AMONG THE 30-ODD CIOS WHO SERVE BOSTON'S WORLD-FAMOUS HEALTH-CARE institutions, John Halamka is a star among stars. He has been CIO of the CareGroup health organization and its premier teaching hospital—the prestigious Beth Israel Deaconess Medical Center—since 1998. He helps set the agenda for the Massachusetts Health Data Consortium, a confederation of executives that determines health-care data policies for New England.

Until 2001, the 40-year-old Halamka also worked as an emergency room physician, but he gave that up to take on the additional responsibilities of being CIO of Harvard Medical School in 2002. However, as a globally recognized expert on mushroom and wild plant poisonings, he is still called when someone ingests toxic flora.

All of this has earned Halamka a considerable measure of renown. For two years running, *InformationWeek* named Halamka's IT organization number one among hospitals in its yearly ranking of innovative IT groups. In September 2002, CareGroup was ranked 16th on *InformationWeek*'s list of 500.

Two months later, Beth Israel Deaconess experienced one of the worst health-care IT disasters ever. Over four days, Halamka's network crashed repeatedly, forcing the hospital to revert to the paper patient-records system that it had abandoned years ago. Lab reports that doctors normally had in hand within 45 minutes took as

- What can happen if an old network is asked to carry new applications
- How standard disaster recovery protocols can fail
- Lessons learned from the four-day crisis

PHOTO BY JOHN SOARES

I made a mistake. And the way I can fix that is to tell everybody what happened so they can avoid this.

–CAREGROUP CIO JOHN HALAMKA

long as five hours to process. The emergency department diverted traffic for hours during the course of two days. Ultimately, the hospital's network would have to be completely overhauled.

This crisis struck just as health-care CIOs are extending their responsibilities to clinical care. Until recently, only ancillary systems like payroll and insurance had been in the purview of the CIO. But now, in part because of Halamka and his peers, networked systems such as computerized prescription order entry, electronic medical records, lab reports and even Web conferencing for surgery have entered the life of the modern hospital. These new applications were something for health-care CIOs to boast about, and Halamka often did, even as the network that supported the applications was being taken for granted.

"Everything's the Web," Halamka says now. "If you don't have the Web, you're down."

Until last Nov. 13, no one, not even Halamka, knew what it really meant to be down. Now, in the wake of the storm, the CIO is calling it his moral obligation to share what he's learned.

"I made a mistake," he says. "And the way I can fix that is to tell everybody what happened so they can avoid this."

Sitting in his office three weeks after the crash, Halamka appears relaxed and self-possessed. There's another reason he's opening up, talking now about the worst few days of his professional life at CareGroup. "It's therapeutic for me," he says, and then he begins reliving the disaster.

wednesday
THE NETWORK FLAPS

ON NOV. 13, 2002, a foggy, rainy Wednesday, Halamka was alone in his office at Beth Israel when he noticed the network acting sluggishly. It was taking five or 10 seconds to send and receive e-mail. Around 1:45 p.m., he strolled over to the network team to find out what was up.

A few of his 250 IT staff members, who range from low-level administrators to senior application developers, had already noted the problem. They told him not to worry. There was a CPU spike—a sudden surge in traffic. RCA, one of the core network switches, was getting pummeled. From where, they didn't know. It might have to do with a consultant who was working on RCA, preparing it for a network remediation project.

"We happened to have had a guy in there," recalls Russell Rusch of Callisma, the company leading the remediation project. "We knew [the hospital] had had similar incidents in the past few months." Those previous CPU spikes lasted anywhere from 15 minutes to two hours, he says. Then they worked themselves out. Like indigestion.

Halamka's team decided to begin shutting down virtual LANs, or VLANs. They would turn off switches to isolate the source of the problem, much in the same way one would go around a house shutting off lights to find out which one was buzzing. Halamka thought the plan sounded reasonable.

It was a mistake.

Shutting switches forced other switches to recalculate their traffic patterns. These calculations were so complex that those switches gave up doing everything else.

Traffic stopped. The network was down.

Within 15 minutes, by 2 p.m., the team reversed course and turned all the switches back on. A sluggish network, they figured, was preferable to a dead one.

For the rest of the day and into the night, the network flapped—a term Halamka uses to describe the network's state of lethargy dotted by moments of availability and, more often, spurts of dead nothing. The team searched for the cause. Around 6 o'clock, when most of the doctors, nurses, staff and students left, the network settled down. Finally, at 9 p.m., the IT staff found its gremlin: a spanning tree protocol loop.

Spanning tree protocol is like a traffic cop. Data arrives at a switch and asks spanning tree for directions. Say, from John's server to Mary's desktop. Spanning tree calculates the shortest route. It then blocks off every other possible route so that the data will go straight to its destination without having to make decisions at other crossroads along the way.

But spanning tree will look only as far out as seven intersections. Should data reach an eighth intersection, called a hop in networking, it will lose its way. Often, it will drive itself into a loop. This clogs the network in two ways. First, the looped traffic itself gums up the works. Then, other switches start to use their computing horsepower to recalculate their spanning trees—to make up for the switch that is directing traffic in a loop—instead of directing their own traffic.

That's what happened at Beth Israel Deaconess. On Wednesday, a researcher uploaded data into a medical file-sharing application, and it looped. The data was several gigabytes, so it clogged the pipes. Then,

> Around ,
> when most of the doctors, nurses, staff and students left, the network settled down. Finally, at ,
> the IT staff found its gremlin: a spanning tree protocol loop.

Beth Israel Deaconess Medical Center in Boston

PHOTOS COURTESY OF BETH ISRAEL DEACONESS/ORAN BARBER/BRUCE WAHL

when Halamka's team turned off a switch at 1:45 p.m., it was as if one cop closed an intersection and every other cop stopped traffic in all directions to figure out alternate routes.

Halamka's team now knew what happened, if not where it happened. Standard troubleshooting protocol for spanning tree loops calls for cutting off redundant links on the network. "What you're doing is eliminating potential spots where there are too many hops, and creating one path from every source to every destination," Callisma's Rusch says. "It might make for a slower environment"—without backup—"but it should make for a stable environment."

"We cut the links," Halamka says. "It seemed to work. We went home feeling great. We had figured it out."

thursday

CLOGGED ARTERIES

HOSPITALS COME ALIVE EARLY. By 7 a.m., doctors and nurses started to send some of Beth Israel Deaconess's 100,000 daily e-mails. The pharmacy began filling prescriptions, transferring the first bits of the 40 terabytes that traverse the network daily. Some of the 3,000 daily lab reports were beginning to move.

By 8 a.m., the network again started acting as if it were flying into a headwind. Halamka realized the network had settled down the night before only because hardly anyone was using it. When the workday began in earnest, CPU usage spiked. The network started flapping. The problem hadn't been fixed.

Halamka's team scrambled to find other possible sources of the trouble. One suspect was CareGroup's network of outlying hospitals in Cambridge, Needham, Ayer and elsewhere in Massachusetts. They operated as a distinct network that plugged into Beth Israel Deaconess. The community hospitals' network was sluggish, and a billing application wasn't working, according to Jeanette Clough, CEO of Mount Auburn Hospital in Cambridge, which serves as the hub for the outlying hospitals' network.

The easiest thing to do would be to cut the links, eliminating the potential for spanning tree loops. But that would isolate the outlying hospitals. Instead, the IS team, along with Callisma engineers, chose a more complex option. They would try converting from switching to routing between the core network and the outlying hospitals. That would eliminate spanning tree issues while keeping those hospitals connected.

They tried for seven hours, and, for arcane reasons that have to do with VLAN Trunking Protocol (VTP), they never got the routing to work. The network flapped all day.

Around midmorning, as Halamka was explaining the routing strategy to CareGroup executives in an ad hoc meeting, a patient, an alcoholic in her 50s, was admitted to Beth Israel Deaconess's ICU. Dr. Daniel Sands, a primary care physician and director of the hospital's clinical computing staff, saw her. She had what Sands calls "astounding electrolyte deficiencies," a problem common to people who drink their meals. In fact, Sands says, "It was incredible she was alive.

"I needed to be careful with this woman. I needed to try treatments based on lab reports and then monitor progress and adjust as I went," recalls Sands. "But all of a sudden, we couldn't operate like that. Usually I get labs back in less than an hour; they were taking five hours, and here I have a patient who could die. I was scared." (The patient would survive.)

At 4 p.m., Halamka met with a minicrisis team that included the head of nursing, the heads of the lab and the pharmacy, and hospital COO Dr. Michael Epstein. "Even then,"

Patients sort of expect you to know their histories. I had to walk up to patients I had treated before and ask basic questions like, What allergies do you have?

–DR. DANIEL SANDS, PRIMARY CARE PHYSICIAN, BETH ISRAEL DEACONESS MEDICAL CENTER

TAKING ACTION

Beth Israel Deaconess CIO John Halamka learned two chief lessons from his four-day disaster

LESSON 1
Treat the network as a utility at your own peril.

Actions taken:

1. Retire legacy network gear faster and create overall life cycle management for networking gear.
2. Demand review and testing of network changes before implementing.
3. Document all changes, including keeping up-to-date physical and logical network diagrams.
4. Make network changes only between 2 a.m. and 5 a.m. on weekends.

LESSON 2
A disaster plan never addresses all the details of a disaster.

Actions taken:

1. Plan team logistics such as eating and sleeping arrangements as well as shift assignments.
2. Communicate realistically—even well-intentioned optimism can lead to frustration in a crisis.
3. Prepare baseline, "if all else fails" backup, such as modems to query a network and a paper plan.
4. Focus disaster plans on the network, not just on the integrity of data.

Halamka says, "I'm still saying, 'We're one configuration change away,' and my assumption is things will be back up soon."

But his team was tense and frustrated. CareGroup's help desk had been flooded with calls. They were hearing everything from "I can't check my e-mail" to "I don't know if the blood work I just requested went through."

At 3:50 p.m., Beth Israel closed its emergency room. It stayed closed for four hours, until 7:50 p.m., according to Massachusetts Department of Public Health documents.

It was at the 4 p.m. meeting that COO Epstein says he realized "this was more than a garden-variety down-and-up network." Clinical users, like Sands, were signaling that they were worried. Epstein and Halamka, along with hospital executives and network consultants, decided to take extreme measures. They called Cisco Systems, the hospital's San Jose, Calif.-based equipment and support vendor. Cisco responded by triggering its Customer Assurance Program (CAP), a bland name that belies how rare and how serious CAPs are. CAP means Cisco commits any amount of money and every resource available until a crisis is resolved.

CAP was declared shortly after 4 p.m. By 6 p.m., a local CAP team from nearby Chelmsford, Mass., had set up a command center at the hospital and initiated "follow the sun" support—meaning additional staff at Cisco's technical assistance centers would be plugged in to the crisis until their workday ended, when they'd hand off support to a similar group a few time zones behind them.

First, the CAP team wanted an instant network audit to locate CareGroup's spanning tree loop. The team needed to examine 25,000 ports on the network. Normally, this is done by querying the ports. But the network was so listless, queries wouldn't go through.

As a workaround, they decided to dial in to the core switches by modem. All hands went searching for modems, and they found some old US Robotics 28.8Kbps models buried in a closet. Like musty yearbooks pulled from an attic, they blew the dust off them. They ran them to the core switches around Boston's Longwood medical area and plugged them in. CAP was in business.

By 9 p.m., they had pinpointed the problematic spanning tree loop. The Picture Archive Communication System (PACS) network, for sharing high-bandwidth visual files and other clinical data, was 10 hops away from the closest core network switch, three too many for spanning tree to handle.

And that's when the dimensions of the problem fully dawned on the team members: They were struggling with an outmoded network. In September 2002, Halamka had hired Callisma's Rusch to audit CareGroup's infrastructure. When Rusch finished, he told Halamka, "You have a state-of-the-art network—for 1996."

Halamka's network was all Layer 2 switches with no Layer 3 routing. Switching is fast, inexpensive and relatively dumb, and it relies on spanning tree protocol. Routing is more expensive but smarter. Routers have quality-of-service throttles to control bandwidth and to isolate heavy traffic before it overwhelms the network. State-of-the-art networks in 2002 have routing at their core.

In 1996, CareGroup's network was Beth Israel Hospital, and at its core was a switch called Libby030. In October of that year, the hospital merged with Deaconess Hospital. Deaconess's network was plugged into Libby030.

Other systems were tacked on in the same way. In 1998, CareGroup connected PACS to what used to be Deaconess Hospital. A year later, CareGroup linked a new data center and its two core switches (RCA and RCB) to Libby030. There would be a fourth core switch added and a skein of redundant links, but Libby030 remained the main outlet. Halamka now understands that this was a "network of extension cords to extension cords. It was very fragile," he says.

To fix the problem, the CAP team decided to put a Cisco 6509 router between the core

PHOTO BY JOHN SOARES

network and PACS, eliminating spanning tree protocol and its seven-hop limitation. (The 6509 also has switching capabilities, so the team decided to kill three switches inside PACS and use the 6509 for that too.)

Soon after 9 p.m., a 747 with a Cisco 6509 on board left Mineta International Airport in San Jose bound for Boston's Logan International Airport.

The local CAP team spent the night rebuilding the PACS network, a feat Halamka talks about with a fair bit of awe: The first time around, PACS took six months to build.

After working through the night, the team was momentarily disheartened Friday morning to see that, despite PACS being routed, the network was still saturated. But they rebooted Libby030 and another core switch, which brought out the smiles.

"We rebooted and things looked pretty," Halamka says.

At 10 a.m. Friday, hospital officials decided to shut down the

friday

BACK TO PAPER

BY 8 A.M., the network started to flap again.

At 10 a.m., Halamka and COO Epstein decided to shut down the network and run the hospital on paper. The decision turned out to be liberating.

"We needed to stop bothering the devil out of the IT team," says Epstein.

Shutting down the network also freed Sands and the hospital's clinicians. Some had already given up on the computers but felt guilty about it. But "once the declaration came that we were shutting down the network, we felt absolved of our guilt," Sands recalls.

The first job in adapting to paper is to find it: prescription forms, lab request forms. They had been tucked away and forgotten. And many of the newer interns had never used them before. On Friday, they were taught how to write prescriptions. When Sands had to write one, it was his first in 10 years at CareGroup. "When I do this on computer, it checks for allergy complications and makes sure I prescribe the correct dosage and refill period. It prints out educational materials for the patient. I remember being scared. Forcing myself to write slowly and legibly."

At noon, Epstein came in to lend a hand...and walked into 1978. Epstein worked the copier, then sorted a three-inch stack of microbiology reports and handed them to runners who took them to patients' rooms where they were left for doctors. (There were about 450 patients at the hospital.)

In time, the chaos gave way to a loosely defined routine, which was slower than normal and far more harried. The pre-IT generation, Sands says, adapted quickly. For the IT generation, himself included, it was an unnerving transition. He was reminded of a short story by the Victorian author E.M. Forster, "The Machine Stops," about a world that depends upon an über-computer to sustain human life. Eventually, those who designed the computer die and no one is left who knows how it works.

"We depend upon the network, but we also take it for granted," Sands says. "It's a credit to [Halamka] that we operate with a mind-set that the computers never go down. And that we put more and more critical demands on the systems. Then there's a disaster. And you turn around and say, Oh my God."

Halamka had become an ad hoc communications officer for anyone looking for information. Halamka was the hub of a wheel with spokes coming in to him from everywhere—the CAP team, executive staff, clinicians and the outlying hospitals. Halamka leaned on his emergency room training at the Harbor-UCLA Medical Center in Los Angeles, during the height of gang violence in the '90s. Rule one: Stay calm and friendly.

"But I'll be honest, 48 hours into this, with no sleep, the network's still flapping, I had a brave face on, but I was feeling the effects," Halamka recalls. "I was feeling the limitations of being a human being. You need sleep, downtime. You need to think about shifts, or humans will despair."

He found himself dealing with logistics that had never occurred to him: Where do we get beds for a 100-person crisis team? How do we feed everyone? He improvised.

"You don't know the details you're missing in your disaster recovery plan until you're dealing with a disaster," he says. For example, the paper plan was, in essence, the Y2K plan. Besides the fact that it was dated, it didn't address this kind of disaster.

Recovery plans are usually centered on lost data or having backups for lost data, or the integrity of data. At Beth Israel Deaconess, the data was intact. It was just inaccessible.

That led to Halamka's chief revelation: You can't treat your network like a utility.

"I was focusing on the data center. And storage growth. After 9/11, it was backup and continuance. We took the plumbing for granted. We manage the life cycle of PCs, but who thinks about the life cycle of a switch?"

This is a valuable insight. Networks indeed have gotten less attention than applications. But at the same time, Callisma's Rusch says, he hadn't seen a network as archaic as Beth Israel's in several years. "Many have already gotten away from that 1996 all-switched model," he says. "There are probably a couple of others like this out there."

Others agree with Rusch's assessment. "I think the danger is people start thinking the whole health-care IT industry is flawed and a train wreck waiting to happen," says the CIO of another hospital. "It's not. We all watched the heroic effort they made over there, but we're not standing around the water cooler talking about how nervous we are this will happen to us. We've had these issues. They scared us enough a few years ago that we took care of the architecture problem."

Halamka retreated to his office late Friday night. He lay down on the floor, pager in one hand, cell phone in the other, and fell asleep for the first time in two days. Two hours later, his cell phone rang.

saturday
HELPLESSLY HOPING

HALF AWAKE, Halamka heard a staffer tell him they had found two more spanning tree errors, one at a facility called Research North and one in cardiology. Both had eight hops, one too many. They planned to cut the redundant links and move the traffic to the core network.

No one knew for sure how severely this would tax poor Libby030 and its counterparts. The team decided to build a redundant core with routing infrastructure as a contingency plan that would bring CareGroup out of 1996 and into 2002 in terms of its network.

network and run the hospital on paper.

At 8 a.m., two more Cisco 6509 routers (with switching capabilities) arrived from San Jose. Three hours before that, a trio of Cisco engineers from Raleigh, N.C., landed in Boston. They spent all day building a redundant network core.

Sands felt uncomfortable doing rounds that morning. "Patients sort of expect you to know their histories," he says. "But without that dashboard of information I'd get from the computer, I had to walk up to patients I had treated before and ask basic questions like, What allergies do you have? Even if I thought I remembered, I didn't trust my memory. It was embarrassing, and I was worried."

Progress on the network was slow. No one wanted to suggest that the current tack—building the redundant network core while severing the redundant links—was definitely the answer. At 9 a.m., Halamka met with senior management, including CareGroup CEO Paul Levy. "I can't tell you when we'll be functioning again," Halamka confessed.

Admitting helplessness is not part of Halamka's profile. "You never catch John saying, I'm scared, or I messed up," says one of his peers from the Health Data Consortium. "This had to be hard for him."

"When John told us he couldn't tell us when we'd be up, we stopped having him as part of our twice-a-day reports," Epstein recalls. The intent was to free Halamka from his communications duties so that he could focus on the problem. But Epstein was also becoming frustrated. He recalls thinking that "we didn't want to keep sending out memos to the staff that said, Just kidding, we're still down."

"If I had felt, in the heat of the battle, that someone could have done a better job than me, if I felt like I was a lesion, then I would have stepped aside," Halamka says. "At no time did I think this, and at no time was I fearful for my job. Am I personally accountable for this whole episode? Sure. Absolutely. Does that cause emotional despair? Sure. But I had to fix it."

Saturday night, with the redundant core in place, Halamka turned on the network. It hummed. There was clapping and cheering and backslapping among the team, which had grown to 100. Halamka passed around bottles of Domain Chandon champagne that his wife had bought at Costco. Then he went home.

At 1 a.m., his pager woke him.

Another CPU spike.

peer resources

The old saying "failing to prepare is preparing to fail" is taken to heart at USAA, one of the nation's largest insurance companies, where continuity planning is taken very, very seriously. Read **PRACTICE MAKES PERFECT** in *CSO* magazine at *www.csoonline.com*.

sunday
AND ON THE FIFTH DAY, HALAMKA RESTED

THE PROBLEM WAS SIMPLE: A bad network card in RCB, one of the core switches. They replaced the card. Halamka went back to sleep.

Beep. 6 a.m. This time, it was a memory leak in one of the core switches. The CAP team quickly determined the cause: buggy firmware, an arcane VLAN configuration issue. They fixed it.

All day, the team documented changes. Halamka refused to say the network was back, even though it was performing well. "Let us not trust anyone's opinion on this," he recalls thinking. "Let us trust the network to tell us it's fine by going 24 hours without a CPU spike."

monday
BACK IN BUSINESS

HALAMKA ARRIVED at his office at 4 a.m., nervous. He launched an application that let him watch the CPU load on the network. It reads like a seismograph. Steep, spiky lines are bad, and the closer together they are, the nastier the congestion. At one point on Thursday, the network had been so burdened that the lines had congealed into thick bars.

Around 7:30 a.m., as the hospital swung into gear, Halamka stared at the graph, half expecting to see the steep, spiky lines.

They never came. At noon, Halamka declared "business as usual." The crisis was over. It ended without fanfare, Halamka alone in his office. The same way it had started.

Have you struggled with your network? Share your experiences with Senior Editor Scott Berinato. You can reach him at *sberinato@cio.com*.

RICH CLOW, VP of technology architecture and strategy for Citi Cards, is a big believer in choosing best-of-breed point applications. He says that using integrated packages from single vendors may stretch the software beyond its core competency.

Cheaper and faster has become the motto of almost every CIO, and that's why the reign of vast enterprisewide application suites is drawing to a close. Taking their place are targeted point applications. Here's how CIOs are making the switch.

THIS COULD BE THE START OF SOMETHING SMALL

BY STEPHANIE OVERBY

We may never know what killed the dinosaurs. Comets crashing to earth? Ice creeping down from the poles? Smart little mammals running circles around them? But we will know what killed the giant enterprise application suites that ruled the last years of the 20th century: smart, little point applications. They've already begun to eat the lunch of those lumbering enterprise suites, and if the trend continues (and there's no reason it shouldn't now that Web services is here), in a few years CIOs won't be buying any more tightly coupled, multimillion-dollar enterprise systems from just one vendor.

Reader ROI

- Why point apps can provide deeper functionality than enterprise suites
- Why integrating point apps is often easier than adding a new module to the same enterprise suite
- How Web services can be used to integrate point apps

Case in point: When FleetBoston Financial last summer decided it wanted to automate the process of identifying potential customers for new products, the $13.3 billion Boston-based financial services company received two proposals. One came from

PHOTO BY STEVEN VOTE

NEIL HASTIE, CIO of TruServ, runs the hardware retail chain on a string of integrated point applications that he says works better than any single ERP system.

PHOTO BY CHRIS LAKE

CRM giant Siebel Systems, from which Fleet had purchased millions of dollars' worth of software licenses in 2000. The other was from MarketSoft, a smaller $100 million vendor whose product focuses solely on the kind of lead management FleetBoston was looking to do. And despite the fact that Fleet had scores of unused Siebel licenses, the bank went with MarketSoft's more targeted product, opting for a best-of-breed lead management solution.

"We evaluated the two systems for functionality, cost and speed of implementation," explains Ann Christensen, the former executive vice president of customer and sales management in FleetBoston's consumer banking group, who made the decision. "We found that Siebel had, as you would expect, a broader set of functionality than we needed and didn't go nearly as deep as we needed."

Many companies are making similar choices by seeking out specific point applications and backing away from enterprise application suites. This is a major shift from two years ago when everyone was investing in ERP and CRM packages—the bigger the better. There are numerous reasons for this sea change. Point applications cost considerably less than enterprise suites and often offer more flexibility and deeper functionality. They are easier to implement and upgrade. And, paradoxically, it is sometimes easier to integrate a point app with an already installed suite than it is to integrate new components from the same vendor's suite. For example, Fleet found that the MarketSoft application, according to Christensen, "integrated with Siebel systems better than Siebel systems integrated with Siebel systems."

Siebel and the other big software vendors dispute that contention. They argue that the long-term cost of ownership will actually be higher if a company goes with point applications because of the cost of integration and managing the multiple vendor relationships.

However, Web services is promising to make the process of connecting best-of-breed applications simpler and less costly than it has been in the past, when complicated interfaces were required to integrate solutions from different vendors. In fact, some say Web services may lead to the Holy Grail, allowing companies to link best-of-breed apps for a seamless and much more flexible enterprisewide system. Even enterprise application suite vendors such as Oracle, SAP and Siebel are making their modules compatible with a Web services infrastructure.

"There's a strong backlash emerging against these large enterprise application suites, particularly in these tough economic times," says John Hagel, a Burlingame, Calif.-based management consultant and author of the recently published book *Out of the Box: Strategies for Achieving Profits Today and Growth Tomorrow Through Web Services*. "Today, CIOs are looking for low costs, short lead times and near-term business impact, which is the polar opposite of the enterprise application suite proposition."

THE CASE AGAINST ENTERPRISE SUITES

Neil A. Hastie, CIO of TruServ, the Chicago-based parent company of the True Value hardware chain, was never a big believer in enterprise application packages. "I was the anti-one-size-fits-all ERP guy before it was in vogue," boasts Hastie. "I still don't know of any ERP system that's totally integrated. There's no one suite that will solve everything for everyone."

Hastie got religion after spending $10 million on a 1998 Oracle ERP implementation at Fel-Pro, the gasket manufacturing company acquired by Southfield, Mich.-based Federal Mogul. Hastie found that Oracle's order management system couldn't efficiently handle the heavy transaction volume at Fel-Pro. "It wasn't vast or flexible enough," says Hastie. Then he found that Oracle's warehouse management system wasn't specialized enough to handle Fel-Pro's distribution function; it didn't integrate well with Fel-Pro's materials handling equipment or scanners. Hastie used several different distribution packages, one of which he built in-house and another that was a bolt-on to Oracle.

"What Oracle was really good at was the manufacturing shop floor and financials," Hastie says. "They were just OK at order management. So we had to find another application to bolt on." (Oracle says that since that time it has introduced a completely new order fulfillment solution, 11i, that includes configuration, advanced pricing, order management, transportation and warehouse management capabilities.)

When Hastie took over as CIO at TruServ in 1999, he applied the lessons he learned at Fel-Pro. No ERP system exists at the $2.4 billion member-owned hardware cooperative. The enterprise is running on a suite of applications. They include The D&B Corp. for accounting; a "simple down-and-dirty" general ledger to record financials; a distribution system from EXE Technologies; a homegrown order management system; and what he calls a "data warehouse on steroids" from Business Objects that offers CRM-like analytics, which he assembled himself. This mix-and-match approach may be a little more work in terms of maintenance and integration (TruServ uses Microsoft BizTalk Server and the Oracle Integration toolset to connect everything), but Hastie prefers it to the alternative. "You either have to write some of your own applications in-house or get a package and modify it," Hastie explains. "And like all modifications of enterprise application software, that prevents you from being able to upgrade easily."

Hastie says that as cash has gotten tight, CIOs are getting back to basics. "If you look at the amount of mega millions that CIOs poured into ERP systems, you have to wonder how much further could we have gotten from the true core applications that a company runs on," Hastie says. "And now that IT budgets are getting crunched, those core applications are becoming the focus again."

"We had gotten into a trend where companies were buying massive amounts of stuff, signing a contract for a five-year project, and buying it all up front," says Jim Shepherd, senior vice president of enterprise applications

ESCAPE FROM IMPLEMENTATION HELL

Five steps for minimizing the pain of an enterprise implementation that is going wrong

What do you do if you've already laid down the big bucks for an enterprise application suite and are knee-deep in an implementation that seems iffy? It's a situation many CIOs have been faced with during the past few years. You can't exactly rip out a $20 million investment and start over with point solutions. Here's what you *can* do.

1 **SEGMENT THE IMPLEMENTATION.** If you haven't already divided the implementation into phases, do so immediately, says management consultant John Hagel. Then, once you reach the next major milestone, you can regroup.

2 **SCALE BACK EXPECTATIONS.** "People are looking for magic," says Steve Morelli, senior vice president of strategic planning, business development and IT for San Francisco-based Del Monte. "There's no magic in any of these systems." Let business partners know up front what the systems will and won't be able to accomplish for them. "If you have trouble managing inventory, for example, it's highly unlikely that a piece of software will be able to fix that problem," Morelli explains.

3 **FOCUS ON VALUE.** Concentrate on implementing the 20 percent of the system that will deliver 80 percent of the value for your business. "Leave the bells and whistles on the side," advises Morelli, who's been involved with several enterprisewide implementations in the past decade.

4 **CONSIDER OTHER OPTIONS.** When you get to the end of the current phase of implementation, figure out how much of the remaining work has to do with fundamental issues (for example, data corruption) and how much has to do with the desire to integrate more effectively across the business. You may not need that next module, and the latter can be done in less traumatic and costly ways, says Hagel.

5 **VENT TO THE VENDOR.** If all else fails, go back to your vendor and express your dissatisfaction. "Every vendor fears a blowup in the press," says Chad Eschinger, senior analyst at Stamford, Conn.-based Gartner. "It's in the best interest of the vendor to get it right."

–S.O.

for Boston-based AMR Research. He notes that some CIOs are still paying upward of 15 percent a year in maintenance on licenses they will never be able to use.

"Today, people are buying in much smaller increments than ever before, and they're not signing a contract for the entire suite of applications or buying up 50,000 seats," Shepherd adds. "Those kinds of projects are a thing of the past."

HOW TO AVOID THE UPGRADE HEADACHES

When Rich Clow joined Deutsche Bank in New York City as vice president of eConsulting in June 2000, the financial services company had already decided to standardize on Siebel for CRM; it had invested $10 million on several implementations. So in late 2001 when Clow was looking for a tool that could analyze customer profitability, Siebel was first through the door with a new tool it had acquired from another company. But Deutsche Bank had implemented half a dozen different versions of Siebel CRM in various business units, and all of that software would have to be upgraded before Siebel's new profitability analytics tool could be installed.

Instead, Clow and his team decided to invest more than $1 million in Alphablox, a privately held, 100-employee business intelligence application vendor based in Mountain View, Calif. Clow found that Alphablox offered a Web-based analytics system capable of connecting the data housed in the existing Siebel systems with the bank's profit and loss data in a way that would allow employees to analyze each banking customer's profitability. "We decided it was easier to use Alphablox than to integrate those different Siebel systems implementations," Clow says.

Clow believes that big CRM vendors are less than valuable to CIOs outside their core competencies (which in Siebel's case, according to Clow, is sales-force automation), though the pressure is often there from the business side to stick with the same vendor. "From a business perspective, particularly in a large global conglomerate, once people have had success with a certain product, contracts are signed and discounts offered, it often becomes simpler to stick with the same vendor even if it isn't the best solution," Clow explains. "But there's a point of diminishing return as you continue to invest in a single vendor beyond their sweet spot."

Siebel admits that although its Inquire module could have provided visibility into profitability, it could not have delivered the kind of profitability engine Deutsche Bank required. "It wasn't a core capability or function of that solution," says David Carter, general manager of Siebel Finance in San Mateo, Calif. "You can always write additional code to make it work, but it wasn't an exact fit."

Last summer, Clow joined New York City-based Citi Cards as vice president of technology architecture and strategy. The credit card company, Clow explains, has no CRM suite but is about to close on a large deal with a small customer data model company to handle customer management. "We needed to add tools around contact management, but we decided to look at small, on-the-cusp types of companies, like small e-mail companies or business performance software vendors," says Clow. Citi Cards will be investing tens of millions of dollars on the customer management project on the assumption that it will pay for itself in less than a year—something few big CRM suites can claim. Smaller vendors are now providing best-of-breed functionality and open architecture that can easily integrate with other solutions—including CRM suites—using standards like J2EE or simple object access protocol, says Clow.

THE FALL OF ENTERPRISE APPLICATION SOFTWARE

Worldwide enterprise application software license revenue

ERP

2000	$7,499,147,000
2002	$4,839,197,000

DOWN (35%)

CRM

2000	$3,991,473,000
2002	$3,025,550,000

DOWN (24%)

SOURCE: GARTNER DATAQUEST

> "THERE'S A POINT OF DIMINISHING RETURN AS YOU CONTINUE TO INVEST IN A SINGLE VENDOR BEYOND THEIR SWEET SPOT."
>
> –RICH CLOW, VP OF TECHNOLOGY INFRASTRUCTURE AT CITI CARDS

Christensen was facing a similar situation at Fleet when she discovered that the bank would have had to upgrade the entire organization to Siebel 7.0 in order to use the vendor's lead management tool. And Fleet had greatly customized the earlier release, making the upgrade option an

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expensive proposition. (For how to minimize the scope and expense of enterprise software upgrades, see "Less Pain, More Gain," available at *www.cio.com/printlinks.*) In contrast, an application processing interface was all that was required to connect the MarketSoft point application to the existing Siebel systems package.

So despite the fact that Fleet, the seventh largest financial holding company in the United States, had purchased a lot of extra licenses from Siebel, Christensen made the decision to go with a small, targeted application. Fleet invested just over a million dollars on the MarketSoft lead management product. The navigational tool operated on rules that each of Fleet's business unit managers could customize and change over time. In contrast, the Siebel lead management module was based on rules hard-coded into the system, as they are in most enterprise suites. If Christensen had needed changes or customization, she would have had to call in a programmer.

Furthermore, the MarketSoft product required less business process change than Siebel's and had the potential to pay for itself in a year, at a time when Fleet was hurting financially (revenue was down 27 percent and profits were down 76 percent in 2001), says Christensen, now a freelance CRM consultant in Andover, Mass. "I was able to target the investment to match the revenue and enable a best-of-breed solution versus going with a CRM suite that had many more business processes that I'd have to implement or take out, and I didn't want to do that," she explains. Using MarketSoft "was an example of a laser-focused implementation to meet the economic need."

Siebel executives say Fleet would not have gone in that direction if there had been a match between the company's enterprise objectives and business decisions further down the line. "Fleet had made a huge commitment to Siebel at an executive level, but that didn't translate down," says Siebel's Carter. "At the business level, they were focused on a very narrow piece of functionality—they were looking specifically for lead management and not a broader enterprise solution."

KELLY SCHMITZ, IT director of Cubist Pharmaceuticals, sees Web services as a fast and inexpensive way to tie together a number of new point apps for his company's growing infrastructure.

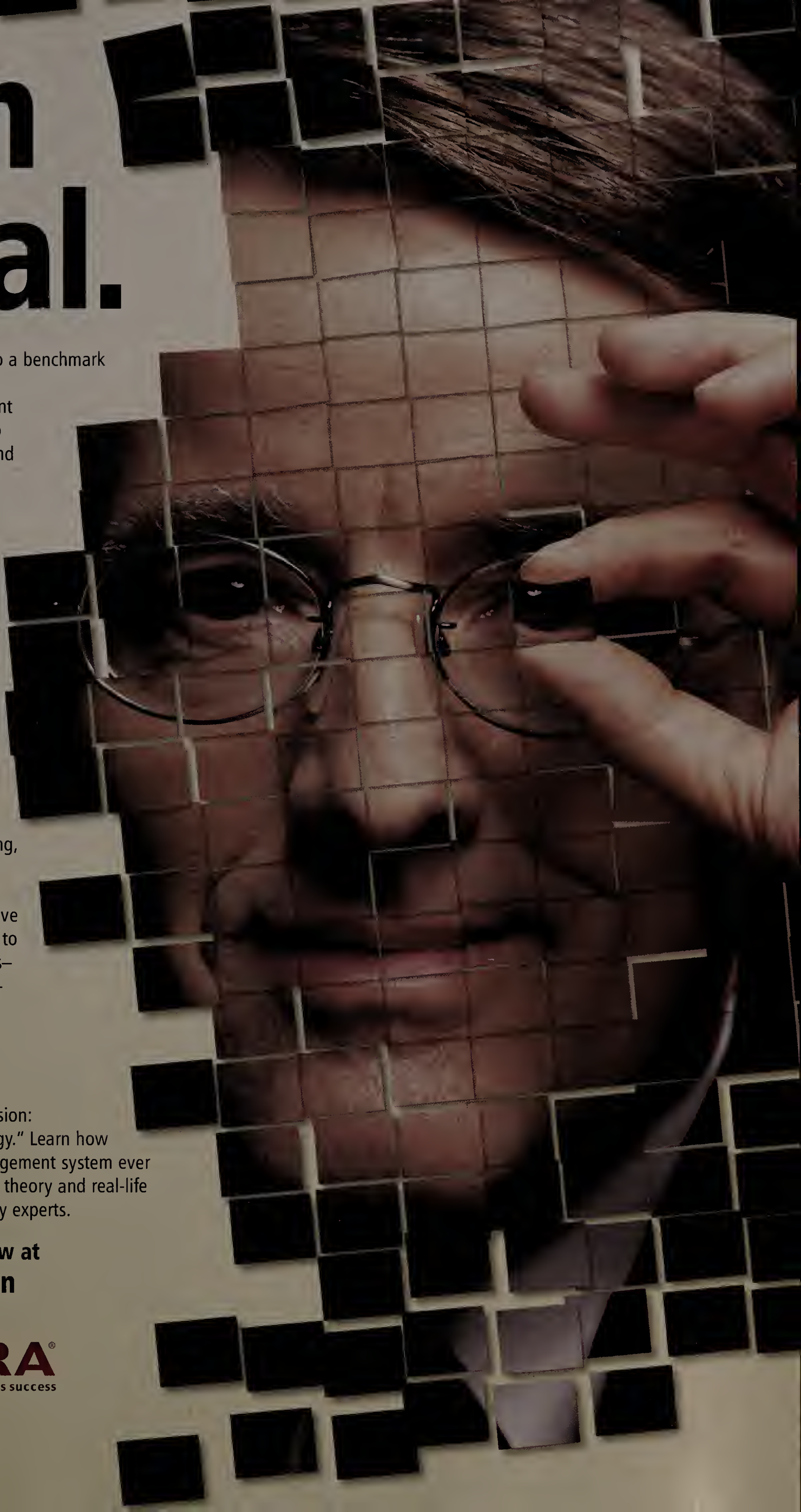
PHOTO BY FURNALD/GRAY

Most CIOs, however, are searching for just these kinds of lower risk, quicker return investments. "[CIOs are] all looking for limited risk investments with payback in a year's time," Christensen says. "Today, CIOs are looking at ways to invest only in what they need to deliver fairly certain results."

THE WEB SERVICES GLUE

CIOs who have the benefit of a clean slate can avoid some of the big three-letter application suites from the get-go. At Cubist Pharmaceuticals, a Lexington, Mass.-based biotech company that develops antimicrobial drugs that fight life-threatening hospital infections, IT Director Kelly Schmitz is creating a flexible architecture that will support the company's current financial systems and also its future sales, data warehousing, clinical trial management and CRM systems. And he sees Web services—not enterprise application suites—as the way to accomplish that.

Cubist does use Oracle's 11i ERP suite for financials, human resources and some manufacturing functions, Schmitz says, but the implementation will stop short of salesforce automation. "It's not that we're dissatisfied with Oracle's solution; it's just that



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their sales solution doesn't work for pharma-based sales," Schmitz says. "It's more geared toward the sale of widgets." In contrast to sales efforts at a manufacturing company that sells products to individuals, Cubist's sales staff tries to get hospitals excited about the potential benefits of its investigational drug Cidecin (for which Cubist filed a new drug application with the Food and Drug Administration at the end of 2002)—from getting them involved in clinical trials to selling them the drug once it's approved.

> "AS PEOPLE BEGIN TO BUILD OUT ON AN ENTERPRISEWIDE SCALE USING BEST-OF-BREED TECHNOLOGY, THEY'RE GOING TO ACHIEVE A LEVEL OF FLEXIBILITY AND SPEED THAT THE MONOLITHIC SYSTEMS CAN'T."
>
> –KELLY SCHMITZ, I.T. DIRECTOR FOR CUBIST PHARMACEUTICALS

Because Cubist is more concerned with its relationships with entire hospitals than individual doctors, Schmitz is looking for an account management rather than contact management tool. Oracle's offering in this area, which focuses on the analysis of person-to-person encounters, would not, in Schmitz's estimation, help Cubist track its success in selling hospital staff on the value of its drug. It's a situation that arises from time to time, according to John Wookey, Oracle's senior vice president of application development. "Our applications won't always fit the specific needs of every customer," he admits.

The challenge for Schmitz will be in integrating an account management app with various outside sources of competitive sales data and hospital-specific sales numbers, such as IMS and Verispan, as well as applications to be introduced in the next year to automate clinical trial management, medical affairs and marketing campaign management. Web services, Schmitz says, is designed to standardize the method by which all of these applications exchange data and provide platform-independent EAI.

CIO.COM Are you joining the enterprise backlash? Is the small-is-beautiful route the one for you? **TALK BACK** to share your views—and read those of your peers—online at *comment.cio.com/talkback*.

"I have seven new point applications I need to roll out in the next year that will need to talk to each other. Web services can tie together applications that were never made to interact with each other," explains Schmitz, who is using a Web services platform from Reston, Va.-based Dimension Data for a pilot application. Schmitz had success last year using Web services to tie Microsoft Outlook's resource scheduling function to Cubist's conference room phones to track meetings and make better use of the companies' limited meeting space. He notes that a Web services approach tackles integration issues at about 75 percent of the cost of traditional middleware.

The standards-based Web services approach also makes scalability less of an issue than it is with the big enterprise application solution. Schmitz previously worked at PerkinElmer Life Sciences, an Oracle pharmaceutical shop, where he witnessed big problems (and even bigger costs) as the enterprise acquired more companies and tried to integrate a large number of customized applications. "Being in a much smaller company now with a huge potential for growth, Web services is very attractive," he says. "We can take a modular approach to delivering systems and simply plug in applications as they are completed, knowing that Web services will allow data exchange in real-time."

Compared with the traditional method of connecting point solutions via an interface, which must be done from scratch each time a new application is introduced, or implementing a big suite of applications that requires a CIO to rip out existing applications, Web services can be a less complex and costly proposition, Schmitz says. Once one application has been exposed as Web services, those services can be accessed in a standard way by any other application and on any other platform. Thus, Web services allows IT executives to leverage what's already in place.

"One of the values people are seeing in Web services technology is that, unlike enterprise application software, it's an overlay on existing technology," Hagel says. "There's a much smaller investment required than when you're forcing people to implement all new applications."

Web services standards are still evolving and security remains an issue, but CIOs may be willing to make that trade-off for increased flexibility. "It's relatively new technology, but something like Web services is very attractive," says Steve Morelli, senior vice president of strategic planning, business development and IT for San Francisco-based Del Monte.

Schmitz predicts that more CIOs will eventually move to the component-based systems made possible by Web services. "As people begin to build out on an enterprisewide scale using best-of-breed technology in every category, they're going to achieve a level of reliability, flexibility and speed that the monolithic systems will never be able to achieve," he says.

E-mail Senior Writer Stephanie Overby at *soverby@cio.com*.

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SUNDAY, APRIL 27

8:00 am–1:30 pm
Golf Tournament

3:00 pm–5:00 pm
Registration

6:00 pm–8:00 pm
Registration, Welcome Reception & Golf Awards

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MONDAY, APRIL 28

7:00 am–8:00 am
Networking Breakfast

8:00 am–8:15 am
Welcome

ABBIE LUNDBERG
Editor in Chief, CIO Magazine

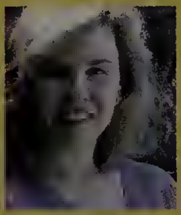
JONATHAN ZITTRAIN
Conference Moderator and Cofounder, The Berkman Center for Internet & Society, Harvard Law School

8:15 am–9:15 am
The Complete CIO

CHARLIE FELD
Founder, The Feld Group & Former CIO of First Data Resources, Delta Air Lines, Burlington Northern and Frito-Lay

The CIO role has evolved dramatically over the past several years; the nature of the job is more complex than ever—and the tough economic climate necessitates keeping an ever-vigilant eye on bottom-line pressures. CIOs increasingly have more of a hand in defining and driving corporate business strategy. And everyone—business line managers, the executive management team, the CEO, the board of directors—has greater expectations of their CIO. What are the essential skills and attributes needed to thrive in the CIO role today? Charlie Feld talks about his own experiences over time as CIO of very diverse businesses, and what his client companies demand today as they look to the CIO's organization to continually help transform the company.

9:15 am–9:40 am
State of the CIO Survey Results Highlights



LORRAINE COSGROVE
Research Editor, CIO Magazine

9:40 am–10:30 am
View from the Top: Creating Value Through IT

NIGEL MORRIS
Cofounder, President & COO, Capital One Corp.

Morris shares his viewpoint on the role of IT, and the criteria for measuring a CIO's ability to articulate and deliver true IT value to the enterprise.

10:30 am–11:00 am
Coffee Break and Sponsor Exhibits

11:00 am–11:45 am
Sponsor Briefings

11:55 am–12:40 pm
Sponsor Briefings

12:45 pm–2:15 pm
Networking Lunch

2:30 pm–3:45 pm
View from the Front Lines: Delivering Value Through IT

Moderator: JONATHAN ZITTRAIN

Participants:
JACK KEEN
Author, Making Technology Investments Profitable
HOWARD RUBIN
Vice President, META Group, Inc.

A blue-ribbon panel of executives discuss making the business case for IT initiatives, the dos and don'ts of portfolio management, critical success factors in doing post-implementation audits—and the importance of clear communicating all along the way.

3:45 pm–5:00 pm
The CIO Interview

MONTE FORD
Senior Vice President & CIO, American Airlines

Ford took on the top IT spot at the world's biggest airline at the end of 2000, then had to deal with the acquisition and merger of TWA, the economic recession, Sabre selling its outsourcing business to EDS—and the events of 9/11. *CIO* magazine Editor in Chief Abbie Lundberg talks with Ford about his pivotal role in the organization and his plans for the future of IT.

5:00 pm–6:30 pm
CIO Peer-to-Peer Networking & Reception

TUESDAY, APRIL 29

7:00 am–8:00 am
Breakfast & Informal Discussion Roundtables

8:00 am–8:45 am
What Every CIO Should Know About Digital Rights Management

JONATHAN ZITTRAIN

Entertainment companies aren't the only ones with digital content worth safekeeping. More companies now are realizing the potential threats and are seriously weighing the risks of not implementing digital rights management (DRM) technologies. These technologies can leverage your work if you produce content—and confound it if you consume it. They are infusing everything from video to text. Zittrain explores recent trends in DRM deployment and discusses the impact on businesses of all types.

8:45 am–9:45 am
Best Practices for Evaluating Hot New Technologies

Moderator: MARTHA HELLER
Director, CIO Magazine's Best Practice Exchange

It's the universal problem for CIOs: Hot new technologies confront you daily, and you need to make the decision to adopt or ignore every single time. If you hop on the hype, you could risk millions—along with your reputation—but if you hang back and wait, you could miss the boat. This panel of CIOs, drawn from the CIO Best Practice Exchange, *CIO* magazine's private online network of senior IT executives, offers practical advice for evaluating the "next best thing."

9:45 am–10:30 am
Becoming a Trusted Business Partner

JERI DUNN
Senior Vice President & CIO, Tyson Foods, Inc.

The CIO's sphere of influence has never been larger. You must work with executive management and peers, internal and external customers, line of business directors, staff and vendors. You must set and achieve both strategic and tactical goals, articulate and demonstrate ROI, communicate and manage expectations. Dunn shares the benefit of her experience.

10:30 am —11:00 am
Coffee Break & Sponsor Exhibits

11:00 am–11:45 am
Sponsor Briefings

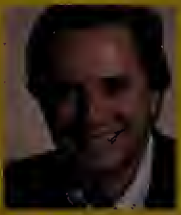
11:55 am–12:40 pm
Sponsor Briefings

12:45 pm–2:00 pm
Networking Lunch

2:15 pm–3:30 pm
InFocus Workshop Breakout Sessions

InFocus Workshops are designed to give conference attendees the opportunity to meet in smaller groups, and discuss specific topics and issues in greater detail.

3:45 pm–4:45 pm
Developing the Next Generation of IT Leaders



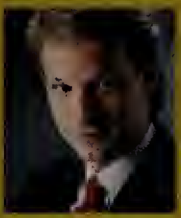
Moderator: RICK SWANBORG
President, ICEX

Panelists: DAVID GUZMAN,
Senior Vice President & CIO, Owens & Minor

MAMIE MILLARD,
Senior Vice President, Technology, Travelocity.com

In addition to honing their own leadership abilities, CIOs are concerned with identifying and developing effective leaders in their organizations. How do you train the technical staff to better understand and communicate with the business side? How do you pick the person to spearhead a key initiative? How do you effectively delegate responsibility? Swanborg and a panel of CIOs discuss the challenges involved, and share the techniques they've used to mold the next generation of IT leaders.

4:45 pm–5:30 pm
How to Get a Life



DR. RICK BRINKMAN
Doctor of holistic medicine and author of Life By Design: Making Wise Choices in a Mixed-Up World, *and* Dealing with People You Can't Stand

With the Internet, cell phones, laptops, wireless and loads of other nifty gadgets, we can now work anytime from anywhere in today's 24/7 global business environment. Some say it's wonderful because it gives us and our employees more flexibility. Others think it's terrible because it means we're expected to be on call all the time. Either way, it's a fact of life. Dr. Rick looks at why it's increasingly important to maintain a healthy balance between Life and Work.

5:30 pm–5:45 pm
Closing Summary

JONATHAN ZITTRAIN

5:45 pm–6:45 pm
Networking Reception

7:30 pm–9:30 pm
***CIO* Dinner Party**

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THE UNLIKELIEST G-MAN

Can Darwin John, a mild-mannered, compulsively conceptual CIO, survive in the FBI's macho culture long enough to transform the bureau from a technological Keystone cop shop to an IT-powered collection of supersleuths? Don't bet against him.

BY SARAH D. SCALET

On the five-minute morning walk from his Washington, D.C., apartment to the FBI's J. Edgar Hoover building, Darwin A. John, the bureau's new CIO, thought about his upcoming interview with this reporter and made himself a promise: "I'm just going to talk specifics." Infrastructure upgrades. A virtual case management system with multimedia capabilities. A data warehousing project with advanced search functions that would help the FBI "know what it knows," and thereby prevent intelligence failures like the ones that led to 9/11.

But despite his best intentions, that's not what happens. By 9:30 a.m., John, a slightly rumpled, deeply jowled elder of the CIO profession, is talking about how the FBI needs to think "holistically," how law enforcement agencies and the Department of Homeland Security can work together to find "simplicity on the other side of complexity," and how having a philosophical bent could work to his advantage at an agency that worships action, not thought.

Got all that?

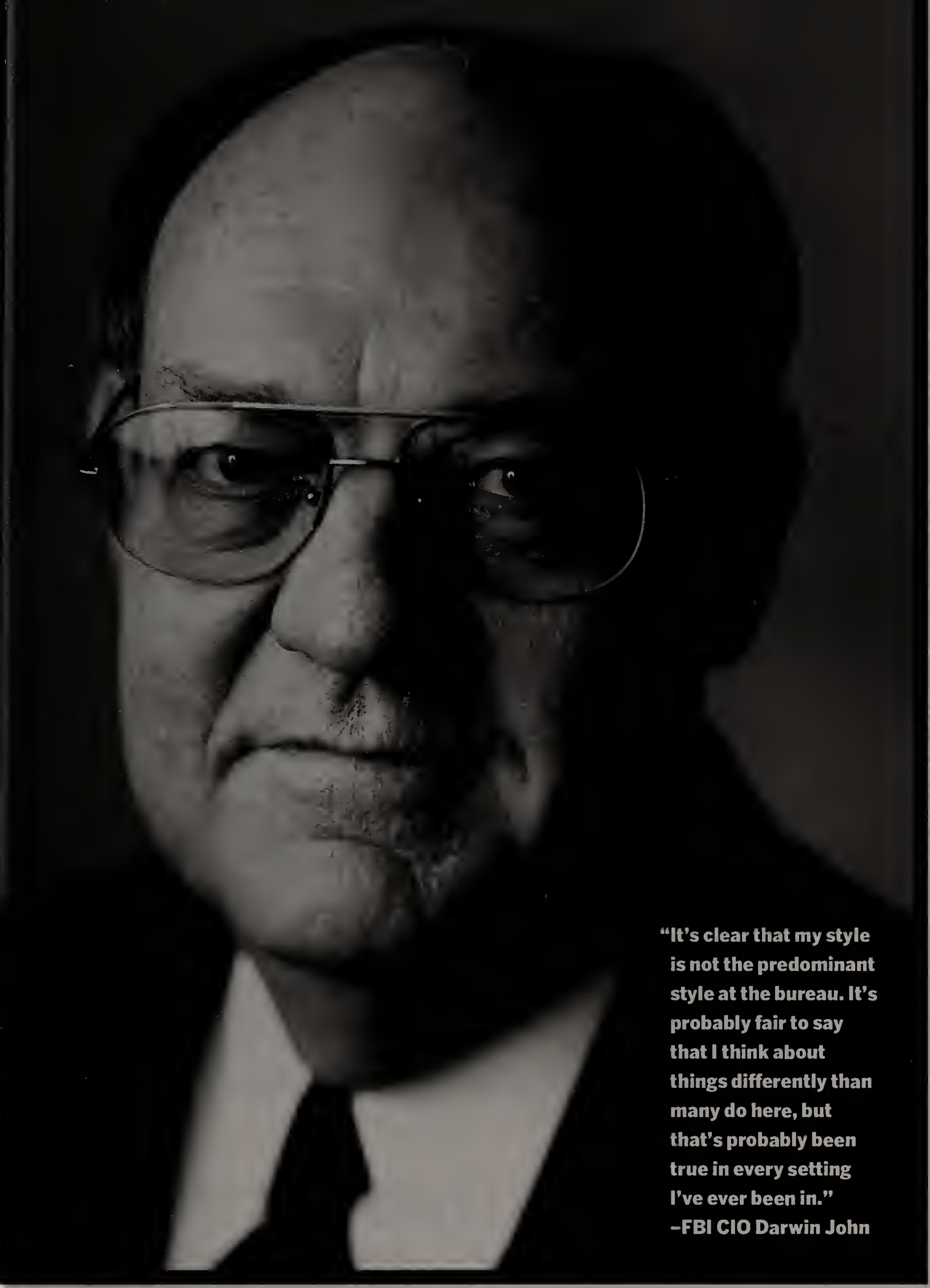
"I'm talking about three things at once, which I always do, because that's the way I think," says John, 64, who's tall (5 feet 11 inches) without seeming so (he hunches) and speaks authoritatively in a quiet voice. He has clear blue eyes that he veils and unveils by taking off and putting on his eyeglasses throughout the day. "For me," he says, explaining how he thinks about his plans to remake the FBI's IT, "there's a canvas, and we're painting a picture, and we'll draw a little tree here or rock there. I don't start at the top and work to the bottom. That drives some people crazy."

What remains to be seen is whether it will drive Washington crazy enough to prevent John from completing his picture. The FBI is not known for valuing introspection, yet on July 8, after an extensive national search, it chose this compulsively thoughtful and unassuming man, and charged him with transforming this almost mythical agency from a Keystone cop shop into an IT-powered hive of supersleuths. As one of FBI Director Robert Mueller's most prominent appointments after 9/11, John, former CIO of the Mormon Church and Scott Paper, has put his neck on the line in a way few federal government CIOs ever have.

He didn't do it for the money. The position was advertised at between $125,972 and $138,200 a year for a person who, as the recruiter who led the search puts it, "could be pulling down his $500K." John and his wife of 45 years, both lifelong Mormons, left their home state of Utah last July so

Reader ROI

- How the FBI's new CIO is dealing with the bureau's modernization challenges
- The perspective of a forefather of the CIO role



"It's clear that my style is not the predominant style at the bureau. It's probably fair to say that I think about things differently than many do here, but that's probably been true in every setting I've ever been in."
–FBI CIO Darwin John

PHOTO BY RON HOLTZ

that John could move into a bare office in the seventh-floor executive corridor known to FBI insiders as Mahogany Row.

Now, instead of gazing out his window upon the mountains of Salt Lake City and the desert valley that Brigham Young transformed into Mormon country, John sees the terra-cotta roof of the Department of Justice, a building surrounded by tall fences and stern guards. This new view is a harsh reminder of the war on terrorism—and the intense pressure on the bureau to protect the people of the United States.

The Father Bear

In 1983, at Scott Paper, John became one of the very first people to be called a chief information officer—a title he worried people would interpret as "an ego thing." At the same time, he began expanding the borders of the discipline. He wanted to move from IT into general business management. "Some days I say it's cruel and unusual punishment that someone would have to be responsible for a data center for three decades," he says. But as it worked out, he introduced business management into IT and in that way became a gentlemanly forefather of the CIO profession.

"Darwin taught us how to be CIOs. You watch what the Father Bear does," says Steve Finnerty, board member and former president of the Society for Information Management (SIM) and a former CIO of Kraft Foods, who first suggested to a recruiter that John would be a good candidate to fill the position vacated by retiring FBI CIO Bob Dies. "Darwin has as an ability to stay in touch with people," Finnerty adds. "I still get a note from him every once in a while telling me how proud he is of me."

Finnerty is not the only one who has watched and learned from the Father Bear. One of the CIOs who gets a chipper note from time to time is John's own son, Steven, CIO of farm cooperative Agriliance in St. Paul, Minn. (See "Unto the Second Generation," Page 71.) Another is Steve Edmonson, vice president of IT and CIO of the Dublin, Ohio-based Cardinal Health's Oral Technologies division, who, with Finnerty, worked for John at Scott Paper.

"There was a time when I thought that good guys could not be successful, and that to get people's attention you had to curse and swear and put the fear of God in them," Edmonson says. "Then I saw Darwin and found another type of role model."

John works in subtle ways his wonders to perform. When leading a meeting, he sometimes avoids sitting at the head of the table, the better to encourage his subordinates to express themselves. He likes to ask his direct reports, "In one word, tell me how you *feel* today," in order to gauge the mood of the organization. "He's not the kind of guy that Carly Simon sang about, watching himself in the mirror," says Cliff Higbee, director of the management information center for the Mormon Church, who reported to John for a dozen years. "He does not raise his voice."

When meeting with vendors, John politely seizes control without employing overt aggression. "One of the things I've said to vendors over the years is, Don't come and sell me something," John says. "Come and sit with me, and I'll tell you what I'm trying to do. We will discover together what makes sense and where we fit."

John hasn't yet dared to play musical chairs at the FBI (he hasn't been there long enough to begin toying with the symbols of his new authority), and federal procurement regulations prevent him from having such frank conversations with vendors. ("Somebody already counseled me: You can bump your head on that one a long time, and maybe you'll just get a bad headache," he says.) He knows he doesn't fit the profile of an FBI honcho. (It's hard to imagine a manager at the FBI asking an agent how he *feels*.) He knows he's something of a misfit. "Being here a few weeks, I feel enormous pressure to fold into doing things the way the bureau does things," John says.

"My choice is not to do that."

A "Burdensome" Bureaucracy

John's choice in this matter of leadership style will simply make a hard job harder. When observers and John himself describe the FBI position as "the Everest of IT challenges," they're not exaggerating. After 9/11, the public started to wake up to what FBI insiders and policy wonks had known for years: The bureau's technology operations were dismal. Newspapers reported how field offices had to share photographs of the 19 hijackers by overnight mail. More disturbing, the perfect vision of hindsight suggests that with better tools, the FBI might have been able to prevent the terrorist attacks altogether.

Agents testified to Congress that the bureau's decade-old case management system--green-screen technology that relies on keystrokes rather than a computer mouse—would let them search for the word *flight* or *schools* but not *flight schools*.

Visitors to the Strategic Information Operations Center (SIOC), where the 9/11 investigations were coordinated, encountered a bewildering sea of papers being faxed and re-faxed to other offices on dozens of fax machines. "I think we both came away tremendously impressed—in a negative way" is how one of those visitors, Rep. C.W. Bill Young (R-Fla.) described his trip to SIOC with another member of the House Appropriations Committee. In June testimony, Mueller himself said the bureau had a "paper bureaucracy" that was "tortourous" and "burdensome."

Then, more than a year after 9/11, during the sniper investigation in the Washington, D.C., area, the same problems cropped up again. Three different command centers were set up with unconnected LANs. Not that information was likely to be entered in any of those systems with any alacrity. According to FBI chronicler Ronald Kessler, the license plate number of the two men who were eventually arrested was written down *11* times by police near the crime scenes but never matched or flagged by the FBI's cranky computer systems. "It was a total wreck," says Kessler, whose most recent book is *The Bureau: The Secret History of the FBI.*

He and others blame former FBI Director Louis Freeh for the sorry state of the FBI's IT. "The first thing [Freeh] did when he came into office in 1993 was to have the computer in his office taken out," Kessler says. "That really tells you everything you need to know about why the technology is in the Stone Age."

FBI CIO DARWIN A. JOHN

The Dossier

PHOTO BY RON HOLTZ

Age: 64

Birthplace: Tremonton, Utah. A one-stoplight farm town. When John was growing up there, its population was 1,000.

Family: Gail, his wife of 45 years, and three sons: Rick, a sales representative for Brock Cabinets in North Carolina, who is involved with the Society for Information Management's (SIM) Regional Leadership Forum; Steven, CIO of Agriliance in St. Paul, Minn.; and David, who works for Microsoft and lives in the Seattle area.

Education: Bachelor's degree in production management and an MBA from Utah State University.

First job: Engineering aide at the Salt Lake City-based defense company Thiokol. After 10 years, John was recruited as a systems analyst in Thiokol's information systems department.

Next job: A brief stint in information systems at Honeywell in Minneapolis. John decided to leave after hearing someone talk about the "kill capability" of a particular ammunition. "My stomach just turned over, and I thought, I'm in the wrong place."

Working his way up: Next, John went to work at Minneapolis-based General Mills in information systems and eventually held the number-two slot there. He was recruited into the top IT job at Scott Paper in Philadelphia, where he was named CIO in 1983.

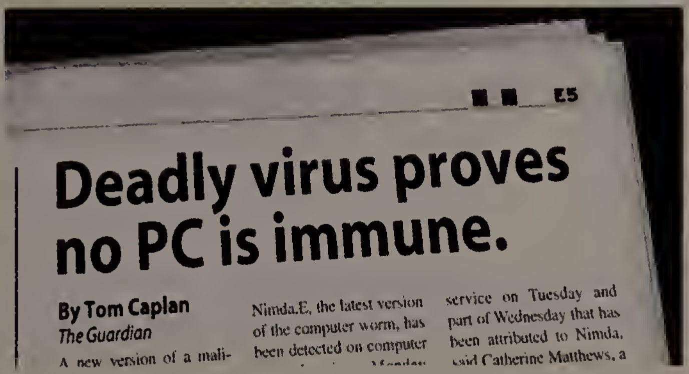
His calling: In 1989, the Church of Latter-day Saints asked John, a lifelong Mormon, to lead the IT and communications department. "My wife and I kind of looked at each other and said, Do we believe what we purport to believe in? And we decided that we did. I went there at somewhere around 20 percent of what I had been making."

Another mission: Steve Finnerty, board member and former president of SIM, told a headhunter that John was a good candidate for the FBI slot. John ended up taking the job last July, deciding that before he retired he wanted to take on "the Everest of IT challenges."

Leadership philosophy: "I believe that soft is hard, and hard is easy. The decoding of that is, the technology is the easy part; the human is the hard part." –*S.S.*

IRONIC HOW MOST IT EXECUTIVES ARE COVERED AGAINST UNLIKELY DISASTERS.

AND NOT THE MOST LIKELY ONES.



E5

Deadly virus proves no PC is immune.

By Tom Caplan
The Guardian

A new version of a mali-

Nimda.E, the latest version of the computer worm, has been detected on computer

service on Tuesday and part of Wednesday that has been attributed to Nimda, said Catherine Matthews, a

Some things aren't a question of if, but when. Like the proliferation of sneaky, new computer viruses. Unfortunately, studies show they will occur with increasing frequency and severity, wreaking havoc on corporate desktops and laptops. Often, even with virus protection. (And don't even get us started on the PC perils from hackers, theft, loss, crashes and user errors.)

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Darwin John in front of the Mormon temple in Salt Lake City (left). As CIO of the Church of Latter-day Saints, he created a searchable database containing 900 million names—exactly the kind of sophisticated system the FBI needs. The IT Johns with Dad (seated): (from left) Agriliance CIO Steven A., Brock Cabinets' Rick D. and Microsoft's David T.

PHOTO LEFT BY KENT MILES

Congress, weary of funding modernizations that never came to pass, simply pulled the plug on the FBI's computer projects and let agents go about their business the old-fashioned way with pens, notepads and guns. But when Mueller took office a week before 9/11, he decided that things needed to change. "Bob Mueller is very tech-savvy, totally the opposite of Freeh, and the first thing he did was start ordering thousands of Dell computers, so now everyone has a new PC," Kessler says. "They got rid of the old stupid machines."

Mueller also started bringing in people like W. Wilson Lowery, who was instrumental in Lou Gerstner's dramatic turnaround of IBM in the mid-1990s. As executive assistant director of administration, Lowery is in charge of the FBI's reengineering. Since June, he's been plugging away at everything from streamlining the travel process to shortening the amount of time it takes to hire a new agent. Most of the projects involve IT.

"Lots of the issues here are the same as at IBM," Lowery says. "It's the NIH factor: not invented here. If it wasn't invented here, then it must not be right. I will tell you, from a reengineering point of view, that there is usually no one gold nugget that you just do, and it makes everything better. It's lots and lots of little things, process changes, and sometimes big changes."

Despite the easy North Carolina lilt to his voice, Lowery is every bit as aggressive and tactical as John is unassuming and conceptual. "Darwin is kind of philosophical," Lowery says, describing their diametrically opposite leadership styles, "and I'm down here trying to figure out how to survive until lunchtime."

A Reputation on the Line

When John isn't prefacing his remarks by saying, "I'm going to go conceptual on you again" or "Allow me to go on a tangent," he describes his technical priorities at the FBI this way. First come infrastructure upgrades, including new PCs and network upgrades, scheduled to be finished sometime this spring. The end result will be a GUI system with enough bandwidth to carry multimedia files. Second is the new "virtual case file" software, which will replace physical case files with virtual ones that include photographs, audio files, news clips or anything else easily digitized and uploaded or downloaded. That has a target completion date of December 2003. Collectively, this project is known as Trilogy because it includes applications, hardware and network capabilities. Its price tag is $379 million.

The third, longer-term project is a data warehousing initiative that would tie together various FBI databases. Eventually, this would be a platform that could give investigators from different agencies access to FBI files on a secure, need-to-know basis.

Meanwhile, some 23 million FBI documents—all the past files to date—have been scanned, and about 8 million of them run through an optical character recognition scanner so that eventually they'll be accessible through the new computer systems.

In many ways, this kind of transformation recalls what John accomplished at the Church of Latter-day Saints, according to the recruiter who led the FBI's search. "Darwin was central to the application of technology to transform the Mormon Church into a global organization and a real global community, with everything from advanced videoconferencing to a very sophisticated Web portal," says Robert

McHale, managing director of Korn/Ferry International in Los Angeles. "None of that was in place before he came. They are a very conservative organization, and he was able to really bridge the communication divide in terms of the value of technology in helping the Mormon Church achieve its mission."

The capstone of John's work at the church is its genealogy records: a group of seamlessly linked databases, containing 900 million names, that help Saints, as Mormons call themselves, find ancestors who they believe are in spiritual limbo and need to be baptized into the faith by proxy. Today its search engine gets 8 million hits a day and will find "Mohammed" no matter how you spell it—exactly the kind of sophisticated name recognition capability the FBI needs to domesticate the information in its wild and woolly computer files.

John, however, bristles at the notion that he was hired because of his achievement in creating the Mormon database. "I hope I was recruited specifically for my capability as a CIO rather than.... Let's talk about it conceptually," he says, interrupting himself. "I would be worried if anyone said we recruited a CIO in order to get knowledge from one company into another."

But if nothing else, the database testifies to the fact that despite his mild-mannered insistence on the theoretical aspects of the CIO job, John can get things done. Real things. Technical things. Big things.

"Darwin looks like he would be a pushover for some in-your-face aggressive consultant talking mile-a-minute," says Dick Dooley, a former CIO at First National Bank of Chicago and at Colonial Penn Insurance in Philadelphia, who helped found SIM in 1968 and has known John for three decades. "But it's not true. Darwin knows how to pull the trigger. He's not a pushover. He's quite capable of dominating a meeting, but he's not dying to do it."

As for whether John can make wheels turn inside the beltway, well, that's another story.

"He's not a Washington insider, so he's going to have to get some good advisers in that area," says Christopher Baum, vice president and electronic government analyst at Stamford, Conn.-based Gartner. John still hasn't passed the major test of speaking before Congress. He admits that he's still struggling to find that delicate line between what he can say publicly about his work and what's classified. But, then, he did manage to maneuver successfully within the Mormon Church for more than a decade—an organization known for being intensely political, intensely hierarchical and intensely private. "John does understand politics," Baum says, "so it might be that he's the right guy for the job."

If he lasts long enough to prove himself, that is. "Maybe [people at the FBI] would feel better if they'd hired some athlete with a strong ego need," Dooley surmises.

But as far as John is concerned, different is good. "Let me quote my wife's father, who is 95 and still going strong. He says, 'If two people think exactly alike, there's no need for one of them.' I think it's clear that my style is not the predominant style at the bureau. It's probably fair to say that I think about things differently than many do here, but that's probably been true in every setting I've ever been in. And, by the way, I think I've built a successful career on thinking about things differently.

"I've always been comfortable with who I am, and if somebody thinks I'm soft and that's bad, then I'm sorry," he says. "They have a problem." CIO

Senior Writer Sarah D. Scalet can be reached at *sscalet@cio.com*.

Unto the Second Generation

A Johnny Appleseed for CIOs

PERHAPS MORE than anything, Darwin John has made a name for himself by seeding the landscape with CIOs, people like Steve Finnerty, formerly of Kraft Foods, and Steve Edmonson of Cardinal Health's Oral Technologies division. But the CIO John is proudest of is his son, Steven, who is one of the first second-generation CIOs.

Not that the younger John set out to follow in his father's footsteps. "Dad's the kind of guy who never gives advice. I started out on a legal track, and he talked me into IT subtly," he says. His father sent him notes about how there were too many attorneys in the world, and introduced him to movers and shakers in the CIO world. Pretty soon, Steven John was selected for a six-month IT training course provided by his first employer, Cigna, and later assumed the executive director position for the Society for Information Management.

CIO Steven John: "Dad's the kind of guy who never gives advice. He talked me into IT subtly."

A year ago, the 41-year-old accepted his first CIO post with the farm cooperative Agriliance in St. Paul, Minn. And he says it's pretty handy having someone he can count on when he has a question about, say, whether to outsource or how to get out of a sticky situation.

"You close the door and call Dad," says Steven. "He's my father, friend and mentor all wrapped up into one." *–S.S.*

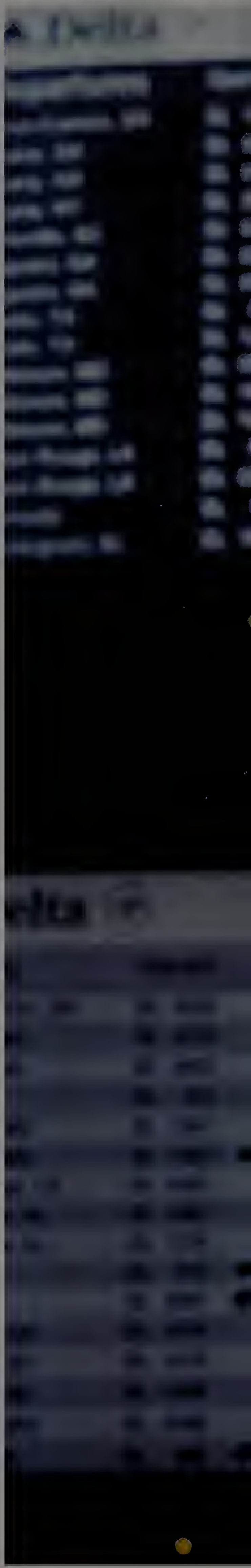
peer resources

The FBI has to learn to share—with once-rival intelligence and police agencies. Sister site **DARWINMAG.COM** compared the task to a corporate knowledge management initiative. Read **PUTTING THE PIECES TOGETHER** on *www.darwinmag.com*.

The Incredible Lateness of Delta

Delta Air Lines is undertaking a billion-dollar upgrade aimed at making the technology laggard an industry leader. But will unstable economic and travel environments stand in its way?

BY STEPHANIE OVERBY



PHOTOGRAPHY BY STAN KAADY

The sepia-toned photos lining the walls of Delta Air Lines' Technology office inadvertently tell the story of an airline mired in tradition: reservation agents from the 1950s shuffling through 3-by-5 cards, crew-cutted control tower personnel sorting through sheafs of paper. While reservation agents are no longer working off index cards—and haven't been for some time—Delta Air Lines has been known throughout the aviation industry as a technology laggard. As little as five years ago, much of the company's operations remained paper-based, and Delta was one of the last major carriers to invest in the Internet.

But in 1998, the 78-year-old airline embarked on an enterprisewide shift. In an attempt to catch up with industry peers like the largest U.S. carrier, American Airlines—an IT pioneer

Reader ROI

- The details of a high-stakes enterprisewide technology overhaul
- How to adapt an ambitious technology project to the harsh economic realities
- How Delta CIOs reinforced the companies' commitment to IT reform

Delta CIO Curtis Robb says the airline remains behind the Delta Nervous System project despite its financial worries.

that created Sabre before any airline had a computerized reservations system—and number-two United—a fast technology follower—number-three Delta began a multiyear, billion-plus overhaul of its IT systems. Thus far, the Atlanta-based airline has spent almost $1.5 billion on technology in the past several years, with more than $50 million of that total going to what it calls the Delta Nervous System (DNS), an entirely new infrastructure on which it has been building applications that automate everything from tasks done at the gate and boarding area to baggage-handling, and inventory and revenue management.

> "Delta's upgrade has actually been like trying to change cars while driving down the highway at **100 miles per hour.** Oh, and by the way, one of the cars just blew a gasket."
>
> –Henry Harteveldt, travel and airline analyst, Forrester Research

Creating a new technology backbone and building all new applications on top of it—while continuing to run an airline—is no easy task in any environment. But the project has also met with a harsh dose of reality along the way. Though work on DNS began in a time of prosperity and stability, $13.9 billion Delta Air Lines has since hired a new CEO, slashed more than 20,000 jobs and gone through three CIOs, the economy has tanked, and America suffered the worst attack in U.S. history leaving the airline industry reeling with bankruptcies, belt-tightening measures and beleaguered major carriers partnering up in an effort to save themselves. "It has actually been like trying to change cars while driving down the highway at 100 miles per hour," says Henry Harteveldt, a San Francisco-based travel and airline analyst for Forrester Research. "Oh, and by the way, one of the cars just blew a gasket."

Many companies would pull over and turn off the car—or even put it on blocks in their garage. And the longer the economy suffers, the harder it will be for companies to stay their course. At a time when some airlines have shelved expensive IT efforts, Delta has continued to invest in more infrastructure and applications, albeit on a delayed schedule.

Delta, which made $990 million in 1998 when the work on DNS began, lost $1.2 billion in 2001 and $1.3 billion in 2002. Last year, it spent $200 million on new IT development (down from $218 million in 2001 and $371 million in 2000) even though total capital spending for Delta decreased by a billion dollars last year. "Delta continues to see this as a key investment," says Curtis Robb, Delta's current CIO. "And Delta Technology will play an integral part in returning Delta Air Lines to profitability." Analysts add that continued investment has the potential to eventually make Delta a leader not only in technology but in the airline industry overall.

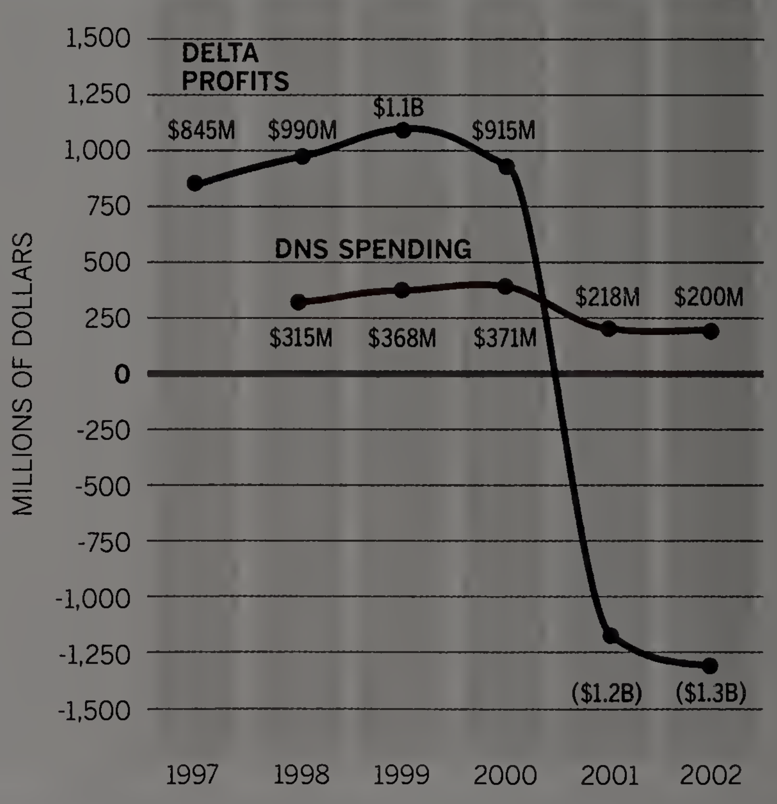
But if and when that will happen remains to be seen.

Staying the Course

Technology spending is often an easy mark for budget cutters when profits tank. But Delta continues to invest in the Delta Nervous System (DNS), a sign of its deep commitment to the technology upgrade.

So far, Delta Air Lines has spent almost $1.5 billion on DNS, a new technology infrastructure aimed at automating every airline function from gate tasks to baggage handling. Following 9/11 and the economic downturn, Delta decided to reduce DNS spending but to continue its funding: For instance, in 2002, even though the company ended the year with a revenue loss of $1.3 billion, it still spent $200 million on DNS.

PROFITS DIVE, SPENDING STRAIGHT AND LEVEL



No Choice But to Start Over

Through the mid-'90s, much of Delta's operations ran on spreadsheets and checklists. Pneumatic tubes were used to shuttle information throughout airports. What systems were in use were scattered and disconnected.

In 1996, things started to go from bad to worse. An outsourcing plan flopped, and so in 1997, the airline hired Charlie Feld, CIO-for-hire and turnaround expert, to heal the technology group.

"They had projects in disarray, people in disarray," remembers Feld, now CEO and founder of Irving, Texas-based Feld Group. Departments at Delta were buying their own technology and hiring their own programmers without any coordination to avoid duplicating efforts. At the same time, the airline had to figure out a way to cope with the pending Y2K problem.

Feld immediately created the wholly owned Delta Technology subsidiary to provide the airline with IT services. And his team decided that the best way to deal with the disparate Delta systems and the year 2000 issue was to rip out the existing, antiquated infrastructure and start over. And while they were at it, they figured, they could start building new applications on which to run the airline. It was a bold move in an industry in which many companies have chosen to live with legacy systems rather than face the costly, complex task of coming up with an enterprisewide technology solution for replacing them, according to John Linehan, an analyst at Baltimore-based T. Rowe Price.

But inside Delta, it was viewed as the only move. "We had seven to 10 years of technology that was just getting older and older, and the risk of it being unreliable was getting bigger," says Dean Compton, vice president of common systems for Delta Technology, who's been at the company since late 1996 and helped get DNS off the ground. "We figured we might as well replace it with something we could build on for the future."

It was sound reasoning, and in the strong economic times of the late 1990s when Delta was selling a lot of expensive tickets, it didn't take much work to convince leadership that it was the way to go. New CEO Leo Mullin even made it one of his main initiatives as the new leader of the company.

Dean Compton, Delta Technology's vice president of common systems, says the airline had no choice but to bet its future on a major technology upgrade.

Mission **Delta**

Every 40.7 seconds, a Delta jet takes to the sky. Getting that airplane off the ground takes information from flight schedules to gate information to baggage-handling to tower operations to customer service. Delta's 2,123 flights each day also require 7.3 million gallons of fuel, 109,000 meals and snacks, 151,000 bottles of water, 87,000 cans of soda, and the list goes on.

"It's basically a big, real-time manufacturing operation," says Robb. "And the one thing that's unique about it is that the customer is actually right in the middle of it, so when it doesn't work well, it's very visible." Another distinction of Delta's manufacturing operation is that accurate advanced planning is nearly impossible. Everything from

CIO-for-hire Charlie Feld came on board in 1997 to turn around Delta's technology, and in the process he helped get the Delta Nervous System off the ground.

weather to shifting economic realities to maintenance issues put wrinkles in plans every day.

So to get much-needed real-time information, Delta chose infrastructure software from Palo Alto, Calif.-based Tibco Software, known for providing systems for Nasdaq and the New York Stock Exchange.

Unlike the TPF (transaction processing facility) systems Delta's airports formerly ran on, which required users to type in a cryptic string of letters and numbers to retrieve information every time they needed it, this new system would operate in front of TPF using a "publish and subscribe" architecture. It would recognize when a certain event occurred—a plane arrived at a gate, a passenger checked in—and would automatically push that current information to the people who needed it.

Construction began in fall 1997. Feld chose to begin by building the gate and boarding application and the infrastructure necessary to support it. That application would touch the most areas within Delta, be most visible to its 104 million passengers, and force Delta Technology to collapse most of its 35 existing customers databases and 40 flight databases (along with a slew of others from crew management to catering). Once that was done, they could create 10 new common data stores, get the necessary middleware in place and build a good chunk of the DNS infrastructure that other applications could share. Fourteen months later, the gate and boarding application rollout began.

The critical first step was a success. Once gate agents got used to the new system, which gave them current information on everything from who had checked in and the location of the connecting passengers to a layout of seats and assignments and standby status, it saved an average of eight to 10 minutes per flight and reduced training time. "I remember when we put in the system in Jacksonville. I saw an overbooked widebody 767—where there's normally a lot of confusion around the gate—boarded by two agents using the technology on time and ahead of schedule," Compton recalls. "I'd seen a similar situation in Salt Lake City where we hadn't put the technology in yet, and they had to use nine agents to board the plane, and it still left late."

In 1999, Delta Technology continued to replace the hardware and wiring in its airports, and began to develop and roll out more applications to plug into DNS, from gate information display systems for passengers to a baggage-transfer application used by luggage handlers via a rugged laptop. Feld thought things were moving along well enough to turn things over to his successor, Robert DeRodes, who came from Citibank, as well as a CTO, Robb, an IBM veteran.

Getting **Nervous**

After becoming CIO in December of 1999, DeRodes continued the DNS work. Among the work done in 2000 and 2001: Check-in kiosks were built, Delta.com was redesigned, flight-searching software was acquired, flight-information display systems were replaced, and virtual check-in was introduced. All the new applications were wired into the new, ever-expanding infrastructure.

But by early 2001, the airline industry had begun to feel the effects of the softened economy. The boom times were over for now, and blindly investing in IT wasn't going to fly. That became clear that spring at a meeting of Delta Technology's board of directors, made up of Delta's president, new CFO Michele Burns, the chief marketing officer and the executive vice president of HR. More than two years into the DNS work, the executive team was becoming impatient. "I remember the exact day—April 17," says Robb, then CTO. "They said, What in the world is this project called Delta Nervous

System, and why in the world do you want to spend millions more on it?"

DeRodes and Robb presented a three-hour overview of the project—what was done, what they wanted to do and why. Lucky for them, Vicki Escarra, the chief marketing officer, was in the room. She had been in charge of airport customer service when they installed the first DNS application, the gate and boarding system. "We had her saying, Man, we couldn't have done what we're doing today if it wasn't for this technology," Robb recalls. The combination of the overview and the satisfied customer from marketing seemed to do the trick. Each project that either lowered operating costs or increased revenue was given the go-ahead. But Burns booked the potential savings and revenue into the budget to show how serious they were going to have to be about getting the returns they were promising, and all future projects had to go through a business case justification. Says Robb: "At the end of the meeting, they looked at us and simply said, Speed it up."

Just as Delta Technology was attempting to **pick up the pace,** the airline industry **skidded to a halt** on Sept. 11.

But just as Delta Technology was attempting to pick up the pace, the airline industry skidded to a halt on Sept. 11. In October 2001, Delta Technology's board reconvened to look at DNS projects with an even more critical, cash-conscious eye. The end result was putting off some projects that had a longer payout (new HR systems and rolling out the baggage-handling system in additional airports like Cincinnati and Salt Lake City) and speeding up others that would inject immediate cash into the company or cut costs right away (drastically increasing the number of self-service kiosks and replacing call center technology). Project priorities shifted, but the overall commitment to new technology remained.

"[Delta's leaders] view technology as one of the mechanisms for speeding the recovery, and they decided to stick with those investments," explains Robb, who took over as CIO when DeRodes left to become CIO of Home Depot in February 2002.

Altering Course

Currently there are more than 20 applications running on the new infrastructure, and Delta processes more than 5 million daily and 134 million monthly business transactions using DNS. Last year, Delta made a commitment to tie in SAP for inventory management, replace technology and introduce DNS-powered software at its 12 major call centers, and develop applications for revenue management that will require significant additions to the existing DNS backbone. But the "flight plan" for DNS and its associated applications has definitely been altered. "Today, we're working only on projects that pay off in 12 months and have ongoing impact for at least three years—either building revenue or lowering operating costs," says Robb.

And certain aspects that may affect the ultimate success of Delta's new commitment to IT remain out of Delta Technology's control. "A big part of how fast we can do this or how successful we are is the airline industry itself. There are always outside factors—like the economy—that have an impact on what we're doing," says Compton. To deal with the decreased capital, Delta Technology is scaling back on rollouts. New and existing applications may be introduced in just one or two hubs instead of all 40 airports, for example, with the intent that once the financial situation turns around they'll be ready to speed up the rollout.

The good news for Delta Technology is that Delta Air Lines' balance sheet looks better than most major carriers. While its operating performance is similar to its big hub-and-spoke brethren and its losses place it at the middle of the pack, it has the most cash of its peers ($1.7 billion in the third quarter of 2002), giving it more staying power and the ability to continue these kinds of investments, according to Jamie Baker, an airline analyst at New York City-based investment bank J.P. Morgan Chase.

Delta says it is likely to continue to lose money this year, putting into question how the billion-dollar DNS buildout has really boosted the bottom line. "It's like they're in a boat that's taking on a lot of water," T. Rowe Price's Linehan explains. "These new systems allow them to bail faster, but the water is still coming in faster than they can bail. Clearly there are lots of benefits to these systems, but it's more difficult to see them right now."

Nonetheless, the current plan is to keep working on DNS-related projects for the foreseeable future, perhaps creating a new kind of tradition for Delta and Delta Technology. "This is not one of those quick fixes or a quick journey," says Robb, noting that some of the most complex areas to connect to DNS, like revenue and inventory management, still lie ahead. "When it comes down to it, I see this work going on for another five years. And that's only because I don't know how to make a plan any further out than five years. We'll be done when we run out of ideas." But then again, even the best plans have been known to change.

Contact Senior Writer Stephanie Overby via e-mail at *soverby@cio.com*.

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the emotional enigma of intangibles

BY JACK M. KEEN AND BONNIE DIGRIUS

(There are equal measures of art and science to factoring the intangible benefits of IT investment decisions into a business case)

WANT TO INJECT SOME LIFE INTO AN OTHERWISE SUBDUED meeting about IT project selection? Take an emphatic stand for including intangibles as a fundamental element of the decision-making process.

Intangibles are an emotional enigma to IT investment decision-making, and there are many different opinions on what to do about the nonquantifiable benefits put forth in defense of making an IT investment. Some of the typical opinions include, "They should be an integral part of credible IT project selection. They should be used as a tiebreaker only. Ban them entirely—they reflect wishful thinking. They are the only true decision factors and thus should drive everything." Not surprisingly, many decision teams, evaluation committees and business case members end up confused and frustrated concerning the approach they should take with such soft benefits.

Intangible has many meanings, depending on the context of its usage and the intention and viewpoint of the speaker. To a financial analyst, an intangible is an asset for which there are no generally accepted accounting standards that allow it to be quantified. "The premium we paid over the book value of our most recent acquisition is carried as an intangible on our financial statements." In that case, something is intangible by regulatory decree, as determined by government or industry regulatory bodies.

To a football fan, an intangible is that mysterious, unexplainable factor that enables one team to beat another. "Our team has always beaten the opponent whenever we've played on the home field. This gives us a real intangible advantage." In sports, intangible is a personal opinion, which may or may not be challenged.

To an IT project selection team member, an intangible is a benefit arising from a proposed investment that is not or cannot be expressed in monetary terms. "Implementing this IT project brings a key intangible benefit—a vastly improved image of our organization with its customers, partners, investors and future employees." Within the context of IT investments, intangibility is a hot, disputed and often confusing issue for the following reasons:

- The definition of intangibility is widely misunderstood and thus often misused.
- There is no central authority to decree a standard definition, so the opinions flow freely, whether they are informed or not.

Making Technology Investments Profitable
ROI Road Map to Better Business Cases
Jack M. Keen
Bonnie Digrius

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- Management thought leaders have conflicting positions on intangibles. Upon closer examination, however, those differences are often semantic.
- IT project selection based on a business case analysis could often go one way or another, depending on how intangibles are handled.

Working Intangibles into the Decision

The reality is that using intangibles "as is" is a valid component of effective IT project selection and demonstration of benefits. All decisions in life have an intangible component to them, whether we realize it or not. Carl Jung said it best in 1933: "[Decisions] have as a rule far more to do with the instincts and other mysterious unconscious factors than with...well-meaning reasonableness."

A good deal of business success hinges on management decisions driven by the gut feel of experience and intuition. Alfred Sloan invented the concept of the successful decentralized corporation when he was leading General Motors in the early part of the 20th century. No data, analysis or precedents could conjure for him in advance something that had never previously existed. It was all intangible, and he had the insight and guts to push ahead. Sam Walton had little "tangible analysis" that told him that his Wal-Mart strategy of discounting would eventually overturn the giants of the day, Sears and Kmart.

IT project decisions need intangible input to clarify important differences between alternative courses of action. Is it important to know that Project A will use a vendor with 100 happy customers, whereas Project B relies on a supplier that simply acquired a smaller company, dismissed most of its employees and incorporated the products into its product line? Which is a better investment? That is an intangible call all the way.

The issue then becomes not *if* intangibles should be included as an integral part of IT project selections, but *how*. Organizations typically handle intangibles in one or more of five ways:

- **Ban intangibles.** With this approach, senior management decrees that no intangibles are allowed in making business cases for IT investments.
- **Allow intangibles on a case-by-case basis.** This is the most frequently used option. Intangibles are allowed into business cases on an exception basis. They are mostly treated as second-class citizens.
- **Use individual intangibles as scorable items.** Intangibles are encouraged and in most cases are expected.
- **Group intangibles together.** This approach is used successfully at some organizations. Sets of similar intangibles are grouped together and a calculation is assigned to the group. The advantages of this approach include ease of explanation and the ability for the decision team to exercise a good deal of latitude in determining how much of the logic and calculations it is comfortable with. A disadvantage of this "group" technique is reliance on numbers that are heavy with assumptions.
- **Convert as many intangibles to tangibles as possible.** Most IT investment decision-makers prefer tangible (hard money) benefits to intangible (soft money) payoffs. Unfortunately, many people actually overestimate the difficulty of "flipping" what seems to be intangible over to a more powerful tangible benefit.

Tangible Genetic Engineering

There are several cases in which decision teams can convert an intangible factor to a tangible: The decision team discovers an analogy with which it is comfortable; politically respected stakeholders endorse the assumptions and calculations; or someone may present an approach to quantification not considered by the decision team or identify a believable and relevant formula for making the calculation.

Converting intangibles to tangibles is made much easier by understanding what differentiates the two. This is called the DNA of tangibility. What makes a benefit tangible or intangible? If a biologist were asked a similar question, What is it that makes a dog a dog or a cat a cat, the answer would be DNA—the genetic code of life that directs living cells to evolve into one form or another.

Tangibility also has DNA—so to speak. If we understand it, it helps us decide what benefits should be tangible or intangible. It also helps us successfully convert intangibles to their more socially accepted cousins—tangibles. The primary DNA elements that distinguish a tangible are a premise or fundamentally held belief, an expression of a logical cause and effect, mathematical formulas to calculate such a benefit, metrics (values assigned to variables) that enable the formulas to be calculated into a monetary value, and citations of proof that support the claims of the previous components.

To successfully convert intangibles to tangibles, keep the following strategies in mind: Look for potential value to the organization that extends beyond the department that will be the primary beneficiary of the project; have access to people who are intimately familiar with the world of the data users; get influential people to endorse the analysis; and be bold. Put all these elements together into a cohesive and believable story, and a benefit becomes tangible because its intended audience believes it to be. In the final analysis, tangibility is an opinion, influenced by all the things that opinions are shaped by.

The thinking behind the conversion of intangibles to tangibles can be further illustrated by reviewing the tangible version of benefit areas many consider to be intangible. Examples of other intangible concepts that we have seen made tangible include: increasing strategic alliance success, increasing the value of intellectual capital, maximizing corporate portal value, reducing litigation exposure, improving the quality of a process, demonstrating customer commit-

CIO.COM Jack Keen will be online for the next two weeks to answer your questions about turning intangibles into tangible business results. To **ASK THE AUTHOR**, go to *www.cio.com/books*.

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ment, placing a premium value on being a "continuous learning company" and making users more self-sufficient.

Managing Intangibles with a Scoresheet

If intangibles will not or cannot be converted to tangibles, the Scoresheet is a useful and popular way to integrate intangibles into the IT selection process. Use the Scoresheet to grade how closely various investment options match each criterion. Once this grading is complete, the total scores of each investment are compared as an indication of the relative value of each to the enterprise.

There are several important principles of tangibles and intangibles to maintain when managing with a Scoresheet:

- Show a balance between the tangible and intangible decision criteria (hard benefits versus soft benefits). The decision team's judgment concerning the relative contribution of tangibles could be 50/50, 90 percent tangibles to 10 percent intangibles, 80 percent to 20 percent, 100 percent to 0 percent, or anywhere in between. The process by which these splits are set is enlightening for the decision team members. It forces them to think out and then reach consensus on how important a variety of factors are toward influencing their final decision.
- Subdivide intangibles into categories like financial, customer, process, and employee learning and growth. That categorization enables the decision team to reach agreement concerning how much various factors—all of which have proponents and opponents—will affect the decision.
- Risks are actively incorporated into the criteria. Once the criteria are established by the decision team, then project candidates can be compared by scoring each of them against the criteria.

Relating Intangibility

Because of the importance of using intangibles in IT project selection, and the inherent confusion in doing so, it can be very helpful if the decision team sends a policy memo out to the business units that clarifies the approach the organization will take in handling intangible benefits.

Here are some strategies to help develop a policy for intangibles management:

- Upgrade research skills, such as interviewing and publication searching. Frequently, tangibility acceptance hinges on the availability of metrics. If the team can uncover comparative metrics, such as those tracked for similar companies in similar industries, the deal is often sealed for an acceptable hard-money calculation.
- Be good at focused interviewing. What hinders workers in getting a quality job done? What inefficiencies exist in costly processes? Who is impacted if a certain event does not happen? Pick your interviewees, and find out what they would like to see happen to make them more effective and more satisfied.
- Beat the clock. Searching for analogies, metrics, formulas and related items takes time. Allow enough elapsed time not only to refine any search but to allow the availability of needed interviewees.
- Approach the process with open eyes and open ears. Like Sherlock Holmes, cast a practiced eye on out-of-the-ordinary behaviors (such as Holmes' renowned comment about "the dog that did not bark") that might give clues toward possible tangibles.
- Be prepared for pushback. Certain types of objections to converting intangibles to tangibles are heard frequently. Be prepared with answers. Here are some examples of anticipated pushback.

Objection: Labor savings do not count. We still have to pay salaries every month.

Answer: Ask them to consider a medium- and long-term view. For example, cost avoidance is a real savings if the enterprise operates reasonably predictably during the time frame of the business case analyses.

Objection: Cannot get any metrics to support the logic.

Answer: Provide conservative "guesstimates," backed up with explanations of assumptions. This at least gets decision-makers thinking about the possibility.

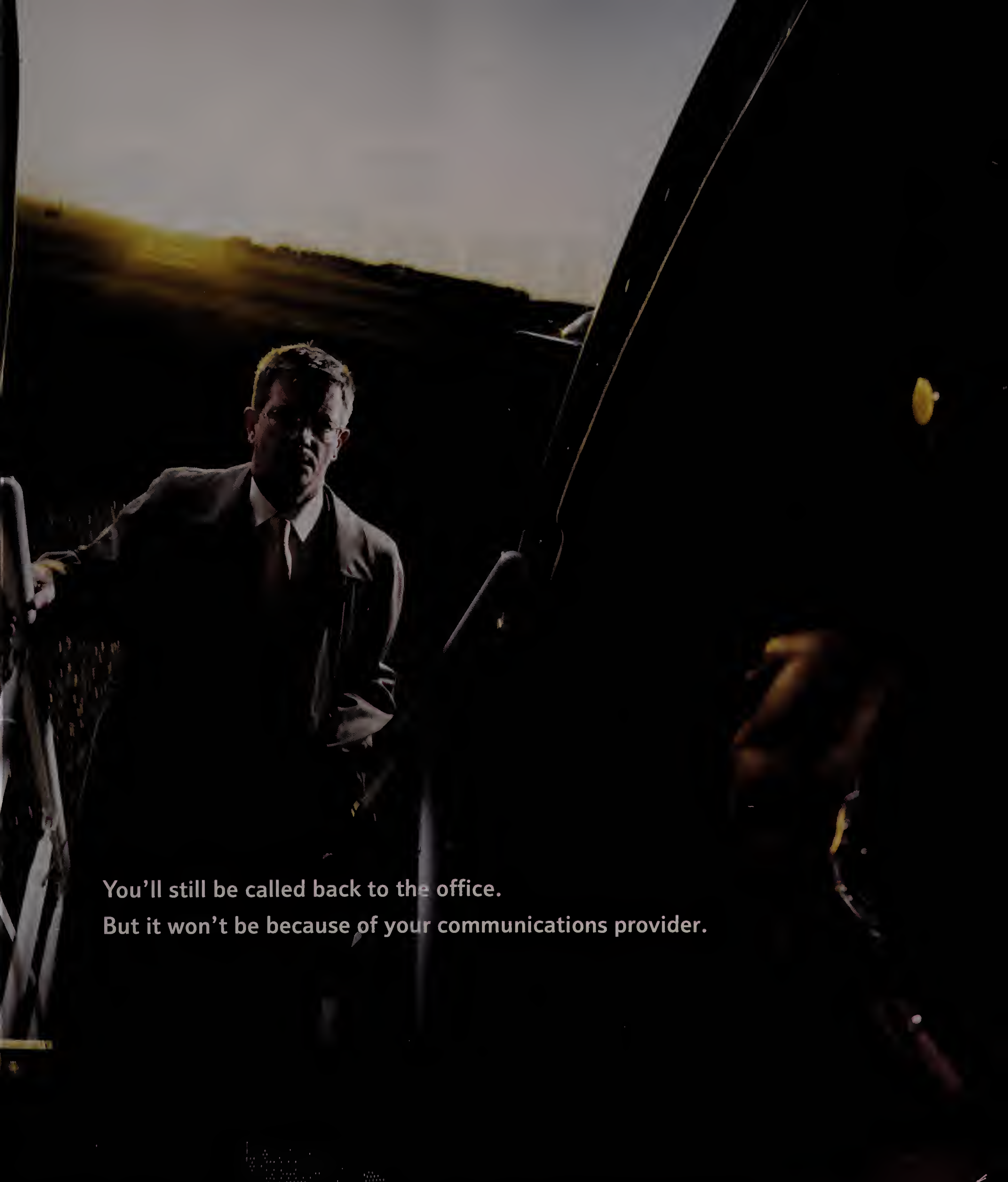
- Monitor the evolution in business thinking. Attitudes about handling intangibles are continuously assessed by leading academics as well as high-profile business leaders. Follow the business press to learn their latest ideas and applications. Often their papers and pronouncements can be used to help gain buy-in to a more open acceptance of intangibles.

> The acceptance of intangibles is by no means a slam-dunk. Someone needs to explain it so that decision-makers will listen, understand and agree.

In the final analysis, whether a benefit is tangible or intangible is an opinion. In most cases, that opinion can be influenced by sound research, a clear understanding of the nature of tangibility and tools that make such pronouncements easy to comprehend.

No matter how seemingly compelling a benefit calculation, or how logical an intangible analysis, the acceptance of intangibles by the decision team is by no means a slam-dunk. Someone needs to explain it in a way that maximizes the likelihood that decision-makers will listen, understand and agree. CIO

Jack M. Keen and Bonnie Digrius are the cofounders of The Deciding Factor (TDF), a consulting firm specializing in tools and methods for defining IT value. They serve as TDF's president and vice president, respectively, and can be reached via e-mail at *jkeen@decidingfactor.com* and *bdigrius@decidingfactor.com*.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Edited by Christopher Lindquist. Send your thoughts and ideas for future columns to clindquist@cio.com.

ILLUSTRATION BY STEVE MUNDAY

Tag, You're It

RFID technology provides fast, reliable asset identification and management

BY JOHN EDWARDS

IF YOU'RE LIKE MOST airline passengers, you don't give much thought to the serving carts that flight attendants use to distribute soft drinks and meals (unless one happens to be blocking your way to the rest room).

Cash-strapped airlines, however, think a lot about serving carts (called trolleys within the industry), which can cost as much as $1,000 each. "We've heard horrific stories of airlines losing up to 1,500 of these things in three months," says

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Tony Naylor, vice president of in-flight solutions for eLSG.SkyChefs, a technology provider for the airline catering industry based in Irving, Texas.

To keep tabs on their vanishing trolleys, airlines and their outsourcing partners, like eLSG.SkyChefs, have tried a variety of different tracking approaches, ranging from bar-code scanning to manually counting inventory. Each technique, however, required at least some degree of human intervention—a significant weakness in a system that aims to keep humans from swiping trolleys.

Like a growing number of businesses that need to track physical assets, eLSG.SkyChefs turned to radio frequency identification (RFID), a data collection technology that uses electronic tags to store identification data and a remote reader to capture information. RFID tags come in many shapes and sizes, ranging from tiny animal tracking tags inserted beneath a critter's skin to 5-by-4-by-2-inch placards slapped on shipping containers, trucks and railway cars.

Naylor says his company was attracted to RFID because of the technology's hands-off nature. "Every time you've got human intervention, things don't always go according to plan," he says. Unlike bar codes, the main competition, RFID doesn't require time-consuming hand scanning or even sequential automatic scanning (readers can capture data at gulps of up to 96 tags per second). RFID information is also readable regardless of the asset's position while a bar code can be blocked by other objects.

RFID has existed for at least a decade, yet the technology has never lived up to its proponents' expectations.

For eLSG.SkyChefs, finding the right RFID technology wasn't easy. The RFID market—systems, software, accessories and services—encompasses more than two dozen vendors, including Lockwood Technology, RF Code and Texas Instruments. "It really was a little bit of a minefield as we went through this because there were so many conflicting stories and opinions," says Naylor. The company ultimately settled on Scanpak, a Dorval, Quebec-based company that offers Galley Equipment Tracking System (GETS), an RFID application targeted specifically at trolley management.

The Case for RFID

RFID has existed for at least a decade, yet the technology has never lived up to its proponents' expectations. "It's always something that's 'the next big thing,'" says Jeff Woods, a senior analyst at Stamford, Conn.-based Gartner. Like others who follow the industry, Woods believes that RFID's acceptance has been hampered by a number of factors, including high costs, a lack of standards and global radio frequency differences that sometimes prevent businesses from shipping RFID-tagged objects between countries.

Many of RFID's shortcomings are gradually being resolved as the industry's vendors join together to make the technology more attractive to businesses. RFID standards covering agriculture, vehicle management, postal items and freight containers are at various stages of maturity. Industry observers are hoping that a basic support framework allowing interoperability between vendors' products will take shape within the next couple of years. Costs are gradually coming down as the technology matures. Frequency conflicts are also becoming less of an issue, as vendors and government agencies work together to smooth out global differences. As a result, although an RFID boom isn't in the wings, steady growth appears likely.

Businesses have much to gain by adopting RFID. The technology provides key information more efficiently than bar codes in a variety of environments (even in hurricanes and blizzards) with little or no human intervention. RFID tags can also contain more information than bar codes, making it possible to retrieve information about an asset's type, configuration, version, location, history of location and maintenance, and other facts. The added speed and rich information provided by RFID can lead to significant savings. "Early implementations have shown a 3 percent to 5 percent reduction in supply chain costs and 2 percent to 7 percent increases in revenue from inventory visibility," says Peter Abell, director of retail research for Boston-based AMR Research.

The Technology

An RFID system consists of two components: tags and readers. Tags (also known as transponders) incorporate a chip and an antenna. Active tags, which include a battery, can transmit hundreds of feet and cost upward of $5. Passive tags are smaller, require no battery and usually have a range of only a few feet. Thanks to their simplicity, they generally cost less than a dollar.

Readers (sometimes called interrogators) communicate with tags to retrieve and, sometimes, write information to the tag. Readers are designed to work with a specific type of tag in one of the four RFID frequency ranges: 125kHz to 134kHz, 13.553MHz to 13.567MHz, 400MHz to 1GHz, and 2.3GHz to 2.48GHz. The reader also relays information into a database and other parts of an organization's IT infrastructure.

The tracking implementation at eLSG.SkyChefs is a typical RFID setup. The trolley tracking solution uses an RFID transmitter tag secured on each trolley

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GO Online For Latest Prices and Weekly Promotions that's scanned by readers at every catering location. Managers can then track equipment anywhere in the world via a Web application.

Simply Complex

Despite its many variations, RFID is a fundamentally simple technology. What isn't so simple, and what has contributed to RFID's slow progression into the mainstream, is its need to mesh with existing business systems and practices. Databases, networks, employee job duties—even warehouse layouts and production lines—must all be tweaked or entirely redesigned to accommodate RFID. "It really changes many business processes throughout the organization," says Gartner's Woods.

Yet RFID can also provide the rationale for a profitable business-line restructuring. Carlsberg-Tetley Brewing, for example, identified RFID as an opportunity to outsource the management of its beer kegs. "It will put the complexities and the rigor of content management into the hands of a better provider," says David Dixon, business solutions executive for the Northampton, England-based beer maker.

Tiny, cheap tags will allow the efficient tracking of even the smallest items, such as overnight letters and packages.

One of the United Kingdom's largest brewers, Carlsberg-Tetley last September sold more than 1 million of its containers (a.k.a. kegs) to Trenstar, a Denver-based asset management company. Under the arrangement, the brewer will pay for use of the containers on a "per fill" basis while Trenstar will retain legal possession of the containers. Trenstar, in turn, will put RFID tags on each container and install fixed readers alongside conveyors inside Carlsberg-Tetley's breweries. Delivery trucks will also be equipped with readers that scan the kegs as they are loaded onto each vehicle and then off-loaded at local pubs.

The arrangement is designed to allow Carlsberg-Tetley to improve its return on capital by removing the containers from its balance sheet. The RFID technology, on the other hand, should let Trenstar cut the losses Carlsberg-Tetley was experiencing from lost and stolen kegs. "That's the result of the need to attach tags to over 1 million containers," Dixon notes. The new system is scheduled to become operational by the end of 2003.

Tag and Read

As RFID evolves and the prices fall, the technology will track an ever-wider array of objects. Many observers also expect RFID to eventually find a home inside a variety of everyday business and consumer products. "RFID is actually already deployed in many retail environments. People just don't think about it that way," says Woods. For many years, in-store theft prevention systems have relied on RFID-tagged merchandise to snare shoplifters. More than 6 million consumers also carry RFID tags on their key chains in the form of ExxonMobil Speedpass tokens. The device, when waved in front of a gas pump-mounted reader, sends an ID code that allows the merchant to deduct the purchase amount from a linked credit card or checking account. "It's a great application," says Joe Giordano, vice president of Speedpass network business and product development at Exxon Mobil in Dallas. "I think it could benefit any retailer, particularly retailers who have convenience-type transactions."

Tiny, cheap tags will allow the efficient tracking of even the smallest items, such as overnight letters and packages. An

Cool Product

Mail It In

LARGE CORPORATIONS with extensive e-mail infrastructures have a new option from an old name—Sendmail. The company has released Sendmail Mailcenter, a highly scalable, enterprise-class e-mail system designed for the most demanding environments.

Mailcenter encompasses a variety of modules, centered on the Sendmail Advanced Message Server 2 IMAP and POP mail server. The modules include Web and wireless access through Sendmail Mobile Message Server 2, Intelligent Inbox delivery filters, and Mailstream Manager for spam and virus scanning.

Sendmail also claims that the system is extremely easy to administer, thanks to centralized interfaces that provide access to policies, provisioning, features, quotas and more.

The software currently supports a variety of operating systems, including Red Hat Linux Advanced Server, SuSE Linux Enterprise Server and Solaris. All modules except the Intelligent Inbox are also available on AIX and Windows. Intelligent Inbox will be available on those platforms by the end of 2003.

Pricing varies by platform, number of users and modules licensed. For more information, call 510 594-5400 or visit *www.sendmail.com*.

–Christopher Lindquist

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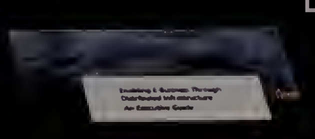

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RFID tag attached to a letter would not only tell a shipper the package's current location but also where it's been and where it's scheduled to go. "Pieces of mail will probably wait until [tag prices] get down to one or two cents," says AMR's Abell. Back at home, miniature tags—perhaps in the form of an implantable chip—will allow pet owners to affordably and conveniently track the movements of Fido and Fluffy. "[Wild] animals have been tracked with RFID for a long time," says Abell. "They even put them on hummingbirds."

Then there's the potential for people-tracking. Sporting event and concert tickets could incorporate tags that allow event organizers to sidetrack counterfeiting, achieve improved crowd flow management and ensure that people sit in their assigned seats. Likewise, RFID could help parents track their kids' movements around an amusement park. More ominously, authoritarian governments could use implantable tags to track people and create lists of places they've visited. "There is a dark side to this technology," says Abell.

Plan and Pilot

As RFID gradually rolls out during the next few years, CIOs should remain aware of the technology and be ready to exploit it when the need arises, advises Woods. "What a CIO needs to be doing right now is to plan and pilot," he says. "I don't think we're going to see a tidal wave in 2003 of RFID adoption, but I do think we'll see some really encouraging stuff going on."

Start small, but think big, suggests AMR's Abell. "RFID has promise, and if you prepare your enterprise for incremental deployments, you will be ahead of the curve but within budget." The danger lies in procrastination. "Organizations that wait too long may watch the competition, as well as potential savings, pass them by," says Abell. ■

John Edwards is a freelance writer based in Gilbert, Ariz. He can be reached via e-mail at *john@john-edwards.com*.

ILLUSTRATION BY STEVE MUNDAY

UNDER DEVELOPMENT

Virtual fiber

Air Speed

THANKS TO THE INTERNET BOOM, telecom carriers have buried plenty of high-speed fiber. Yet CIOs still have to contend with the bother of tapping into all that capacity. This so-called "first mile" problem—an inability to easily link corporate LANs to fiber networks—is the target of a new technology from Lihue, Hawaii-based Loea.

Loea's wireless technology uses high-frequency radio waves to transmit data point-to-point at a speed of 1.25Gbps. The technology is based on arrays of low-noise amplifiers developed to let military aircraft see through fog. "The amplifiers receive very subtle signals created by the electromagnetic radiation coming off of objects," says Lou Slaughter, president and CEO. "Point-to-point applications are an ideal use of that technology."

At the center of a so-called virtual fiber network are transceivers that resemble satellite TV dishes. The transceivers must have line of sight, but they work through windows, so they can be placed inside buildings. And the system offers 99.999% weather reliability, which translates to five minutes of downtime annually. Laser-based communications, on the other hand, historically have 99.9% weather availability over 250 yards.

During the next few months, Loea plans to crank up the data transmission speed to 10Gbps. Fast transmission rates will enable voice and video over IP as well as streaming HDTV.

In addition to bandwidth hogging applications, virtual fiber promises to make it easy for IT managers to interconnect LANs among buildings. The transceivers can be set up in a day without dealing with telecom companies, PBXs, telecom managers or different communications protocols, he adds. Two transceivers currently cost $65,000, but Slaughter anticipates a price of $20,000 by 2004. At the moment, virtual fiber operates over a high frequency spectrum only available for government use. The Federal Communications Commission is currently engaged in a rule-making process to make the frequency available for the private sector.

–Megan Santosus

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BPI Goes Mainstream

CIOs need to know their options before buying performance tools

BY DEAN SORENSEN

CIOS ARE BECOMING increasingly involved in business performance intelligence (BPI), a rapidly growing subset of the business intelligence market. BPI involves planning and budgeting, Balanced Scorecard performance management, and activity based costing. And to be effective, CIOs must understand three things: 1. how BPI apps are changing; 2. the potential value of those changes; and 3. how organizations can best use emerging BPI capabilities.

BPI applications are undergoing three key changes. The first should come as no surprise. Web technology has enhanced these tools' capabilities to quickly collect and disseminate information. The other two changes are not as obvious. They include both broader capabilities beyond traditional BPI, including strategy development, process and knowledge management, and more integrated solutions that include applications from multiple BPI categories.

These trends are significant because they will help organizations move beyond traditional budgeting and functionally based performance management by continuously planning, measuring costs and managing performance around processes and outputs. In turn, stretching the BPI boundaries provides one capability that these applications can't provide individually: the chance to manage trade-offs—the conflicting cost and service objectives that affect virtually every aspect of organization performance.

That all becomes important for CIOs because it lets them more effectively manage several key issues:

- Expectations of senior executives and internal customers, by encouraging informed conversations about planned and actual service levels, in light of budgetary constraints and work volume.

BPI applications present information in a way that enables clear communication.

–Dean Sorensen

- Business value of IT, by expressing it in terms of contributions to lower process costs, higher service levels and revenue.
- Activities and decisions external to IT that affect IT spending and performance.

BPI tools let CIOs achieve those objectives by expanding the scope of IT management beyond the IT function to the entire organization. That enables them to manage IT from the customer's perspective.

The BPI capabilities that will help CIOs address the aforementioned management issues are the same ones that will let organizations address broader management challenges by continuously translating what customers are demanding and willing to pay for into cost and service objectives for specific processes and activities. Flexibility and innovation should increase as people focus on optimizing the cost, cycle time and quality of overall processes, rather than those of individual functions and activities. Companies will also be able to better execute strategy, by turning strategic objectives and budgetary constraints into specific, realistic and executable targets.

Larger and more complex organizations will likely benefit the most from these capabilities. In fact, these organizations are often the same ones struggling to achieve the objectives of ERP and CRM initiatives. In such cases, the value of BPI goes well beyond tactical sources by enabling organizations to fully exploit the information contained in those systems.

Essentially, what BPI applications do is present information in a way that enables clear communication. People can "speak the same language" because there is an explicit linkage between strategic, financial and operational information. Enabling this form of communication will increasingly become an important role for IT to play when creating the competitive advantages organizations seek.

What does all this mean to the CIO? It presents an opportunity to not only confront issues that are important to the IT function, but in the process, help the organization address management challenges critical to strategy execution and profitable growth. Helping an organization establish the right BPI application plays an important role in entrenching the CIO as a business leader.

Dean Sorensen recently published research about the BPI market. He can be reached at *dsorensen@bywater-consulting.com.*

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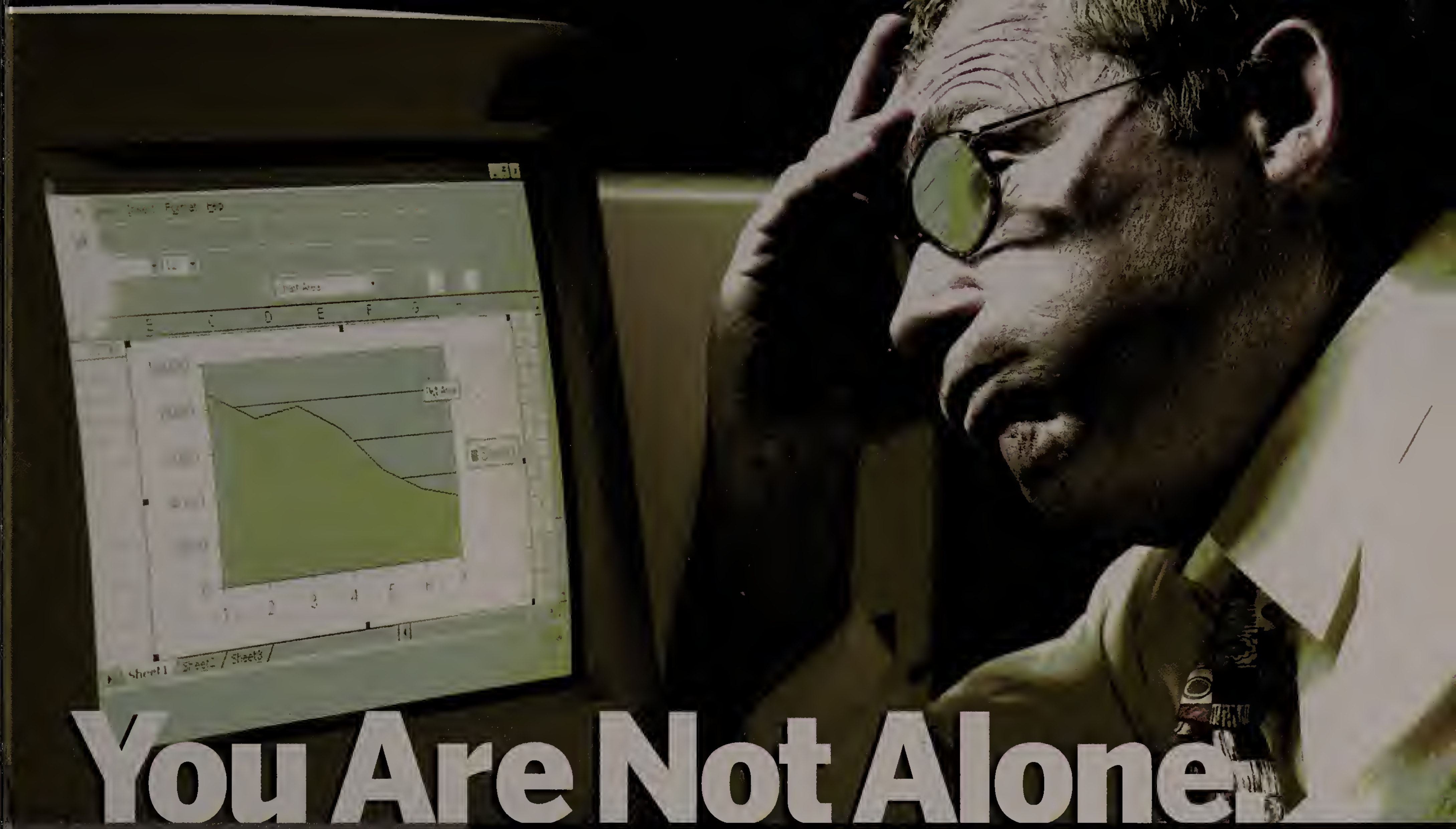
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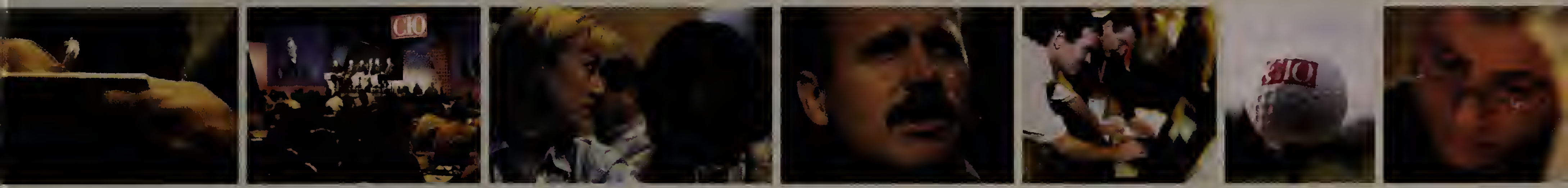

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EXECUTIVE Summaries

February 15, 2003

COVER STORY | A Hospital Network Crisis

By Scott Berinato | **46**

John Halamka, CIO of the CareGroup health organization in Boston, is one of the IT stars of his industry and presides over 21st century clinical applications. But the networks those applications run over have not kept pace. One auditor called it a "state-of-the-art network—for 1996." A spanning tree protocol glitch in Beth Israel Deaconess Medical Center's network set off an unprecedented total system shutdown that plunged the stunned hospital back into the paper era and had doctors fearing for the safety of their patients. It took four days and a Cisco network SWAT team to restore normalcy. Halamka discovered that treating the network as a utility is an invitation to disaster. The network is an organic thing with 25,000 moving parts, and it requires life cycle management. Halamka learned the hard way how many logistics details were missing from his disaster plan.

> "We depend upon the network, but we also take it for granted. We operate with a mind-set that the computers never go down. Then there's a disaster. And you turn around and say, Oh my God."
>
> –DR. DANIEL SANDS, PRIMARY CARE PHYSICIAN, BETH ISRAEL DEACONESS MEDICAL CENTER

Enterprise vs. Point Applications

By Stephanie Overby | **54**

TWO YEARS AGO everyone was investing in ERP and CRM packages, the bigger the better. But today many companies, such as FleetBoston, TruServ and Citi Cards, are turning away from suites and investing in smaller point applications. These cost considerably less than enterprise suites and often offer more flexibility and deeper functionality. Paradoxically, it is sometimes easier to integrate a point app than it is to integrate new components from the same vendor, thanks to open architecture and standards such as J2EE or simple object access protocol. Web services is also making integration simpler and less costly than ever before. On the downside, a mix-and-match approach can be more work in terms of maintenance and managing multiple vendor relationships. Enterprise suite proponents also say long-term cost of ownership will be higher.

Profile: FBI CIO Darwin John

By Sarah D. Scalet | **66**

FORMER CIO OF the Mormon Church and Scott Paper, Darwin John, 64, was chosen last summer to become the new CIO of the FBI. Charged with transforming the bureau from a Keystone cop shop embarrassed by 9/11 and 2002 Washington sniper events into an IT-powered hive of supersleuths—a mission he describes as "the Everest of IT challenges"—John's presentation is extremely low-key. A left-brain, people-focused, theoretical type, he may seem like a misfit within the FBI's predominantly action-oriented culture. But John may be the right man for the job; he managed to get things done despite the politics of the Mormon Church—a hierarchical organization with its own reputation for being closed to the public. There he shepherded a group of seamlessly linked databases containing 900 million names, which help Mormons research their ancestors. His FBI technical priorities include infrastructure upgrades, new case file software and a data warehousing initiative.

Delta Air Lines' IT Overhaul

By Stephanie Overby | **72**

IN 1998, Delta began a multiyear, billion-dollar-plus overhaul of its dated IT systems, including an entirely new infrastructure. At a time when other airlines have shelved expensive IT efforts, Delta has continued to invest; last year, it spent $200 million on new development. Delta has adapted the overhaul to the harsh realities of the economy by putting off projects that would take more than a year to pay off (like new HR and baggage-handling systems) and accelerating others that would inject immediate cash or cut costs (like increasing the number of self-service kiosks and replacing call center technology). To reconcile with a decrease in capital, new and existing applications will be rolled out gradually, in just one or two hubs instead of all 40 airports, for example, with the intent that once the financial situation turns around they'll be ready to speed up rollouts.

Emerging Technology: RFID

By John Edwards | **84**

A GROWING NUMBER of businesses that need to track assets, materials and products are trying radio frequency identification (RFID), a data collection technology that uses electronic tags to store identification data and a remote reader to capture that information. Unlike competing bar code technology, RFID doesn't require time-consuming hand scanning or even sequential automatic scanning. RFID information is readable regardless of the asset's position (a bar code can be blocked by objects). RFID's acceptance has been hampered by high costs, a lack of standards and global radio frequency differences between countries. Those shortcomings are gradually being resolved by vendor cooperation. But the need to mesh the technology with existing business systems and practices remains. Databases, networks, warehouse layouts and production lines must be tweaked or redesigned to deal with RFID. In the meantime, CIOs should plan to be ready to pounce when the right time comes.

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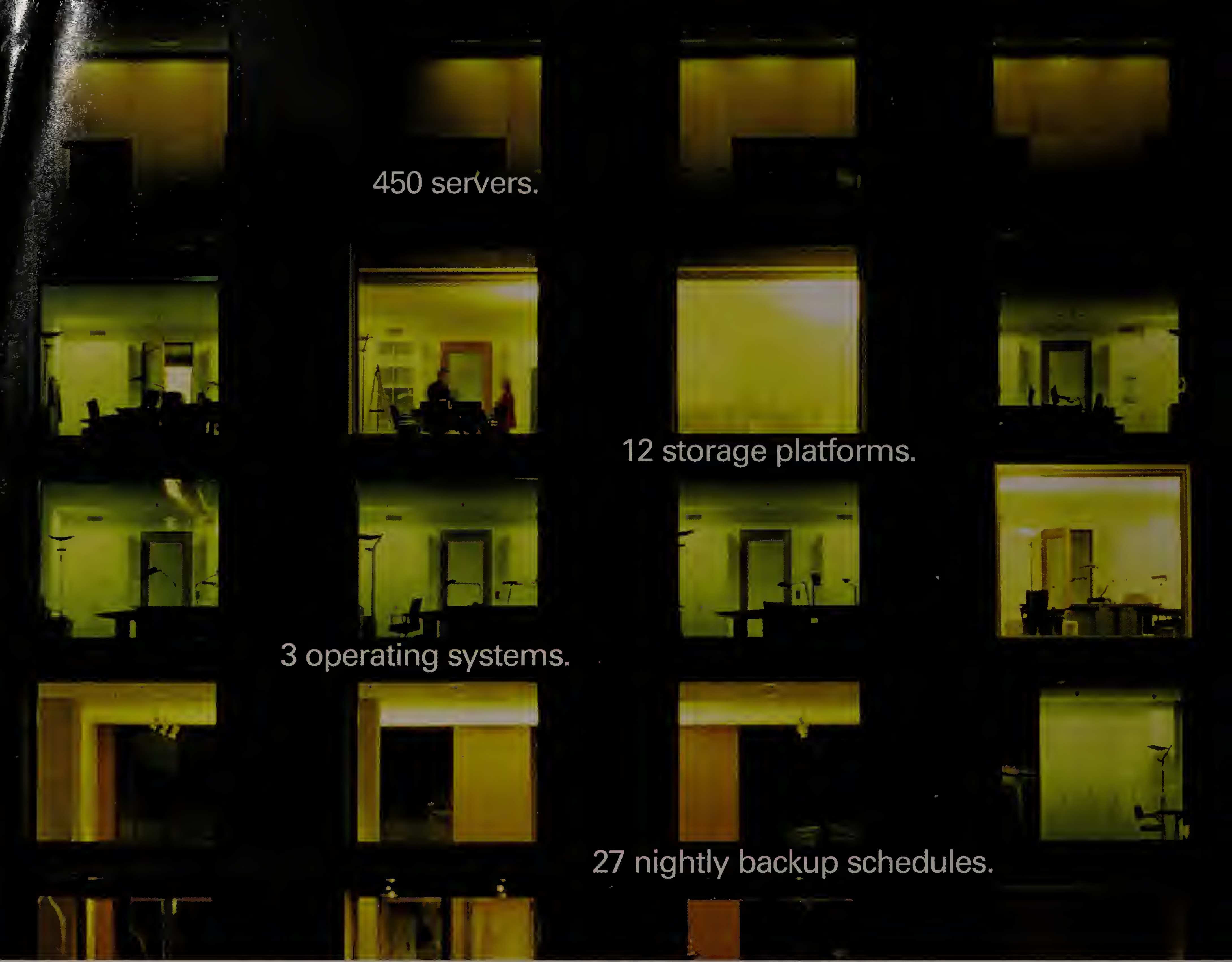

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